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TEMPLE OF HERA AT OLYMPIA c. 700 B.C.

photo. R.M.

DEVELOPMENT IN TOWN PLANNING IN OTHER COUNTRIES ● By E. H. WAUGH.

This paper is designed to be in the nature of a talk on certain aspects of the movement for Town Planning in a few countries visited by the writer in the course of a travel tour during the last few months. The tour covered parts of Scotland, England, Ireland, Canada (East) and the North Eastern States of the U.S.A.

In Scotland, the movement has not yet assumed the magnitude seen in some countries, nevertheless some useful work has been done. The writer visited the Government Chief Inspector of Town Planning for Scotland which has an act in many respects similar to that of England. The completed plans of the Aberdeen and District Joint Town Planning Scheme were inspected and revealed an area of ninety-seven square miles of territory from the sea along the Dee. The work was undertaken by a Joint Committee and the constituent authorities comprised the Town Council of Aberdeen, the County Council of Aberdeen and the County Council of Kincardine. Like others of a similar nature great inspiration was thrown into the effort by one man, a former Lord Provost, and it is due to his magnetism and enthusiasm that many landowners were persuaded to allow roads through their properties for it was explained that the beautiful valley of the river with which the scheme is largely concerned was in many parts cut off from the public.

Owing to this scheme this condition has been now altered and a really fine system of roads has been devised and given the force of a law by an order by the Department of Health for Scotland under date 1933. This will ensure for all time not only the amenities of a beautiful district but the turning open of its loveliness to the people.

Another scheme of magnitude in Scotland has been one largely guided by the City Engineer and Master-of-Works of Glasgow, Mr. Thomas Somers. This covers a much vaster and more industrialized area in and around the second City of Great Britain. I believe the area is about five hundred and twenty-five square miles and the plans show a large framework of new road connections and main thoroughfares. The work has been in progress for years and the consent of land holders has been sought by almost endless negotiations and persuasive and intelligent argument to show that a proper town plan not only benefits the public but also the owners of property. The method adopted has been to use negotiations instead of involving clauses in the law and I gathered that this had been generally successful.

In Edinburgh, the fairy princess of cities, so justly famed by noble town planning in the new town, of which the wonderful Princes Street is a part, there are streets of a noble order like George Street surrounded by classical architecture of a noble character. This part of the city was an extension northwards from the Castle, north of the small loch at the foot of the Castle Rock which at one time filled the basin now drained and used at the lowest part by the London Midland and Scottish Railway and the Great Waverley Station. How wondrously this railway is screened by the Gardens which form the south side of Princes Street. This action redeemed Edinburgh from the general ugliness of a railway line through its centre and will be for all time one of the planning wonders of the world. But, unfortunately, the authors of the new town, who did their work in the eighteenth century, only planned that part and the suburban remainder has grown up in

● *A paper read at the Annual Meeting of the Municipal Association of the Transvaal on October 3rd 1933.*

the terribly unimaginative days of the nineteenth century when mankind seemed to forget the nobilities of foresight and wisdom. The result is that the City outside the immediate centre is extremely badly laid out. The traffic at the west end of Princes Street is concentrated at a junction or focal point of some five streets when the Lothian Road and Queensferry Road begin. The suburbs are practically without any proper lines of cross communication. Approaching from Glasgow Side the writer always carried a map in order to trace a winding and tortuous way from the west to the south of the city. Town Planning in modern days has not yet quite found an important place here although investigating work is in hand. The outer portions of the city cry out for remedial measures of a rather drastic nature. But the meadows, a large great natural park in the middle of the population, and the Princes Street Gardens and Arthurs Seat raising its wonderful shape in the light sun-lit mist make one forget these reproaches and still more when one receives the wonderful hospitality of the City as I was privileged to do at the College of Art where the Lord Provost (as the Mayor is called) gave a reception to a Conference of Town Engineers. In a large hall surrounded by fine specimens of ancient sculpture, the Lord Provost stood with his lady to receive his guests himself arrayed in ermine and scarlet silk with a priceless chain of jewels and gold about his neck. On either side stood two bailies (aldermen) also in ermine and silk and on either side of them again a number of City Councillors arrayed in fine apparel. On each of the extreme wings of this constellation stood two halberdiers armed with the long poled halberds and in mediaeval dress. The effect was very splendid and when the reception was over the whole company lined up for the Lord Provost to depart and followed him two by two to disrobe and rejoin the gathering in mufti. Preceding the Lord Provost was the City Officer in ancient calling-in black with knee breeches and white stockings ; waving his baton of ebony and silver he marshalled the retinue and signalled the Lord Provost to move off. This little description, I hope, will be allowed as a slight illumination on the ways of ancient Cities and the dignity and thought they give to making a good appearance and teaching their people to look on their City work as a calling worthy of the best. The effect was very fine and gave a splendid mixture of colour to the gathering.

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In London, one was most impressed by the unwise planning of other days in the multiplication of terminals scattered about the City at the ends of the railways they serve. These have a weighty effect on the traffic problem for they give rise to great travelling from terminal to terminal and across congested parts of the City. Travelling, as I did, from Plymouth bound for Edinburgh, one detrains at Paddington terminal, gets his baggage decanted into a cab, goes a mile and a half to the St. Pancras terminal and waits some hours for a train north. Two hundred thousand people visit London daily from the Provinces and the travelling through the City by these folk is enormous, obstructive and costly. It convinces one completely that Town Planning is national and not local and that planning without railway co-operation is only half-baked. The loss of time to the railways must also be great as each train from distant parts has to be pushed out and cleaned and brought back again. The fusion of the railways into one system would with gigantic re-planning of the areas between these terminals save time, release much railway property for other uses, enable through passengers to stay in one train from one end of England to the other, ease the cab congestion in the streets, improve and raise the value of the property re-planned, which would in all likelihood more than pay for the change and incidentally and importantly too, provide vast work of a remunerative nature. Such a scheme might easily cost £100,000,000 but it should all come back ! ! The idea is, of course, colossal but planning on lesser lines will only in time bring similar troubles to those now experienced.

There is in London a large Town Planning Joint Committee working on exploratory lines and trying to beat out a line of action. It is the most congested City I visited and while its lack of co-ordinated street systems make it very attractive, it is yearly growing

more troublesome. It is amazing that the grand natural water-street, which London has in the Thames, should have been so neglected in modern times. It is only now beginning to think in waterways and of trying some efficient locomotion thereon. It was the Thames—Father Thames—which made London a City. From ancient times, it was used by Kings and people but since the railway and motor came with their many unhallowing influences, passenger locomotion on the river has practically ceased.

With its non-terminal tube railways, the idea set out above is followed. What has been done in this lesser but important way should be done with the great railways.

A new idea has now arisen, the rail-plane and it is now proposed to create satellite towns twenty miles or so outside, more or less self contained, from which the workers in Ham and Eastern London can be transported in plane-cars (not aeroplanes) at fifty miles per hour in single carriages slung from a single elevated rail supported on huge trestles. The only ground space these occupy is where the feet rest on concrete pads. The cars would travel above the buildings and streets. In appearance the arrangement would look worse than overhead electric standards but from a purely utility standpoint, it may well help to a transport solution of one problem.

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Journeying to Canada by a Cunarder one comes first to Quebec, the old part of which is very cramped. The newer part on the Heights of Abraham—called not after Father Abraham as I have always fondly thought, but after an old river pilot who once had a farm there—is broad and well laid out.

Travelling on to Toronto by one of the world's fastest trains–they claim it beats the Royal Scot—one comes to a much more modern city with some seven hundred thousand people and colossal skyscrapers. Here one sees the grid-iron or right angled street plan and the height of the skyscrapers in dull weather makes the streets dark. The thunder came heavily while I was there, a menacing black cloud attack, so that the Power Station threw out all the switches to save damage. I have never seen such a daytime blackness, not only in the streets but in every office and shop.

In town planning this city has set up an Advisory Committee with the Mayor as President. I learned they had no town planning act in Ontario and so make a large plan of what they want to do and try to do it in nibbles under improvement acts. They also, as elsewhere it seems in Eastern America, have insufficient control of private township lay-outs, nothing like the Township Board in this country. The advisory plan is on a noble scale and plans for a possible one and a half million people.

Incidentally I met here a prominent gentleman who had been given charge of several municipalities who could not pay their bond or loan interest. He told me they could and did borrow as they wished and there was no direct curb on their financial exuberance so the Councils had been for a time quietly thrown out till my friend and his colleagues got matters straightened out, which would take years. I certainly felt surprised but it was lessened as I penerated further south and learnt of the great liberty given in such matters. I reflected that we had one on them here with our Administrator's checks and supervisions of loan permits.

Journeying on through a gloriously wooded and beautiful country from Buffalo—after seeing Niagara—it took a whole day-time to reach Washington. Now Washington is different to nearly every other city for it was preplanned. That is, a huge town was planned before it commenced to grow or be. Most towns grow before they are planned. Washington was planned all ahead and is a fine place, broad streets and imperially rich architecture which would make Augustus envious. The City is planned with a number of focal centres from which streets radiate and in between these radial streets, the plan is more or less rectangular. It is a good plan, but has a rigidity of appearance inherent in pre-plans and absent in places like London. The outline of buildings is unspoiled by skyscrapers. These I saw numerously in Philadelphia, Bun's City—his statue of colossal

size caps the lofty city hall tower. He is regarded as the father of the grid-iron—I do not mean the kitchen article but the street plan resembling it, followed also in upper New York and each block is like Johannesburg's—two hundred feet wide but the length is much greater. It is uninteresting and with its defects and virtues you are familiar. Its parkways—great roads with park strips on each side are magnificent.

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From there to New York is a few hours run. I went in a motor coach to see the fronts of houses instead of the usual railway back-view.

New York claims now to be the largest metropolitan population in the world. The Municipal Council governs some three hundred odd square miles by means of great borough Councils, working under a common Council or Control or Co-ordinator Council. Its town planning interest is now centred in the New York regional plan which covers five thousand square miles. This was worked out over some seven years or more by a board of experts and the present President's late uncle, I believe was the presiding genius. This board was voluntary in its nature—not statutory—I met its Chairman of its present condition which is a propagandist body devoted to educating the public to see big on town planning and get the necessary statutory support to make the plan grow into reality. One man put up a quarter of a million pounds to help this scheme. Many rich Americans overgive to educational and university purposes and a few are beginning to see now that national city planning calls for the best in the nation. America is certainly remarkable in that, the highest public men do all they can to help city planning.

The skyscraper is the most outstanding and astounding thing in New York. It is a weird experience to approach this forest of giant buildings as I did by road from New Jersey. I did not count them but there must be several score. The superior of all is the new Empire State building. It is some twelve hundred and fifty-five feet high or one hundred and two stories reputed to have been built in thirty-three weeks. Its stupendous height is conjoined with the rarest grace of silver outline. It is the most beautiful shaft ever reared by men except perhaps the single exception of the spire of Salisbury Cathedral in England. It is of a whitish almost silvery looking stone and depends entirely on shape and symmetry for its appeal for it has practically no mouldings. I am told it is half empty owing to depression.

The skyscrapers make the narrow streets look like huge kloofs and to look upwards makes one feel like an ant. The argument in their favour is that it is easier to take people up than sideways and therefore they help the traffic problem. Against this is the decanting from one building in a short time of some ten or fifteen thousand people into a small street space.

Time presses so I must just mention Boston, Mass. with its glorious common almost equal to Princes Street Gardens, Edinburgh crowned as it is by a fine eminence on which are the public buildings and state house. Its parkways are magnificent.

From all these countries I got two definite impressions : (1) that we are too small in our allocation for main highways. No one here thinks in parkways or boulevards and indeed the natural grasses here inhibit too much space as they are too coarse. Nevertheless planners do not give enough. (2) that great parks and squares like Hyde Park, Princes Street Gardens, Washington and City Squares, and the great Parks of Washington and Philadelphia are inviolate. In this province we give them away piece meal to schools, libraries, etc. No one seems to stand guardian for future generation's right to open ground.

NOTES ON A MEDITERRANEAN TOUR

Candia Harbour

Hotel Minos Candia Crete

12 December 1933

Actually I should be on the water returning from Crete to the Piraeus, but the boat, in the leisurely fashion of everything Greek, is eighteen hours late. The voyage is only fourteen hours, but a day or two makes very little difference here, so I have had to adopt a like philosophy, unpack and stay another night.

I have had three major excitements since I left England—even four if I count the Simplon-Orient Express which is an experience of delightful travel—a dignified and fitting approach to a country of such beauty.

The first excitement is Greece itself. Even though the lovely northern stretches were passed by night—we reached Salonika about midnight–my first view of snow-covered mountains (black and silver)–autumn leaves and rich lands of reddish brown with small emerald green patches was much more marvellous than I had ever anticipated. The three hours until we reached Athens went in a flash—and I was absorbing every impression like a sponge, trying to store up each one like a miniature Cezanne to be contemplated in the future. And though it is putting the cart before the horse and is probably a complex and over-academic process–it was the Cezannes that I had seen in the Tate that I thought of as soon as I looked out of the train. But I find that here, too, I have a tendency to seek for South African parallels in driving through the lovely countryside—and I have come to the conclusion that it is really a form of mnemonic— to retain the new impressions in terms of something familiar so as not to lose them altogether.

On the other hand photographs do not really familiarise you with the forms which you encounter because the tonal values are nearly always inadequate. Such was my experience with the Acropolis (which is the second excitement). For the lovely buff and golden tones of the marble always appear dark in photographs–and after years of photographs—to experience (to "realise" in Cezanne's phrase) the Propylaea and the Parthenon in the round is an utterly new sensation. I went at once, when I arrived at Athens, and everything favoured my first visit.

The Palace at Phaestos Crete

16 January 1934

My trip to Crete was most interesting. The first afternoon I spent in the Candia Museum which is unbelievably rich in pottery and, of course, all the characteristic products of the Minoan-Mycenaean civilisation. The Boxer Vase, the Harvester Vase and the Chieftain Vase are delightful, spontaneous and well preserved. Although carved in black steatite it is supposed that actually they were covered with gold leaf to imitate metal-ware, however, they are lovely as they are. Fortunately I was able to get full size reproductions (quite small) in gypsum of the Harvester and Chieftain Vases, so you will get a good idea of these. The reproductions are excellent, in fact in two or three text books the illustrations are from reproductions.

The Vaphia cups at Athens are breath taking at first sight, but when one gets accustomed to the superb craftsmanship one misses the creative spark which is present in the other earlier work. The Vaphia cups are stylised and decadent, even in that incredibly remote time! I was particularly struck with Phaestos which is on the south side of Crete. The site is indescribably beautiful. A jutting plateau which terminates a mountain range and rides disembodied amongst the clouds. To the east and far below, stretches the rich and fertile Messara plain. North, great mountains; and a speck halfway up shows where a shepherd found the Kamares pottery.

On the west is a glimpse of the sea and south west (as far as I remember) the valley which was once a thriving town.

The palace itself (or rather palaces of different periods) has been tactfully preserved by the Italian archaeologist Halbherr, and the plan is remarkable, where Knossos is a rabbit warren of passages, light wells, magazines and dark chambers—Phaestos has great apartments on a peristyle court, loggias commanding glorious views, and flights of steps which are an architectural experience in themselves. The two photos with the lovely tissue paper clouds convey something of the drama of Phaestos. The Theatral steps are extremely dramatic there seems no doubt that these were the prototype of the Greek theatre.

It would be tedious to describe my visit in more detail, donkey rides up mountain paths, cold chicken, bread, oranges and wine under olive trees between Hagia Triada and Phaestos, and farm scenes of a rich simplicity which I cannot describe from the Thackeray Hotel!

I must add that Knossos was a great disappointment. Evans has gone quite wild and built a monster of concrete and red and black paint on the ancient site. He has become such a legend that it seems in bad taste to attack anything he has done. But I cannot see any justification for the liberties he has taken. One had thought that at least one or two columns had been found intact—but no—Evans has built the superstructure entirely on speculation and the very dubious evidence of small and often imperfect wall paintings.

The Theatral Steps and Royal Procession Way, Phaestos Crete

The thing looks like a Wembley building for American tourists, and the plea that such construction as he did was necessary to preserve the ruins seems quite feeble when one sees Hagia Triada, Phaestos, Mycenae, Tiryns, etc. "Lord" Evans has popularised Knossos undoubtedly, but the student of civilisation would do better to go where he has not reconstructed and, equipped with his own imagination re-people these pale ruins, so old but really so young, and so romantic, at the beginning of time. Hypothetical models in museums, yes, but my God, to put up "sectioned" full size guesses on the very site. I know nothing of the ethics of archaeologists, but the gentle touch of Halbherr who uncovers, and leaves in peace, I salute! Knossos has been so boosted, too, that it is interesting to see that the finest pottery comes from Phaestos. I have some photos. I think the egg shell ware is overrated, but that is only a personal estimate. The photo of Candia harbour was taken from my bedroom window, a peaceful colourful and attractive spot, right on the womb of western civilisation, and at night the wireless broadcast Tea for Two!

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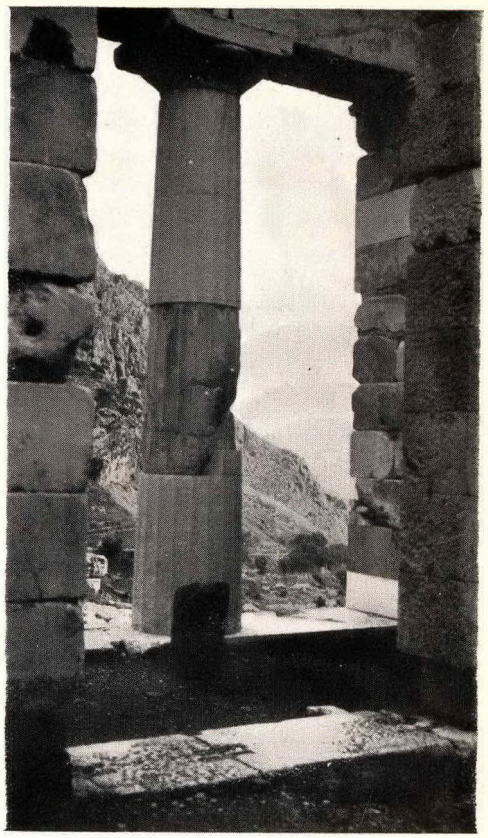
When I returned to Athens I left for Delphi by car (£3 recklessly expended) and in motoring across the most plastic and austerely colourful country in the world I satisfied a classic streak in me which responds to Virgil and Theocritus to the slow beat of red earth and crops (about which I know nothing!) and bright green fields tilted across the valleys like gay scarves. Only the villages are ugly—depressing huddles of buildings jostling and treading the oozing and sucking black mud with blank people staring and staring. But the countryside; Boeotia—rather see IT than Naples, and die! I was quite intoxicated with Delphi, photographing, climbing, dreaming and gathering countless plants (a new role for me!) which, alas, preserved only in cardboard boxes dried up and had to be thrown away. I was so keen to bring back every plant which the Greeks used for decorative motives, and all growing on the site of Delphi, as they have grown for ages and ages.



The Athenian Treasury Delphi

Then I took photos in the Museum of which I am inordinately proud—the Siphnian frieze (and Sicyonian) are early sculptures of the highest order. I send two photos which I took in the Museum (while it was raining and with dull light!)

The next place was Olympia which was a peaceful and secluded interlude after some of my buffetings. Then across Arcadia—a riot of deep valleys packed with clinging gold autumn trees and snow on the mountain tops—in a primitive train with oil lamp and no heating.

Nauplia—Tiryns, a small mound on a plain on which homesick Cretans tried to make a home resembling Knossos or Phaestos. Then Mycenae, so freezing with a wind like knives that I thought my studies would end there. Slipping about on ice and trying not to get blown down hundreds of feet on to the rocks. I was damned glad to get into the train which was as usual two hours late.

Then in a very delightful new ship from Piraeus to Brindisi, a calm voyage across romantic seas with afternoon tea concert and Christmas dinner in surroundings of the greatest elegance and gaiety, a sharp contrast to my primitive voyages to Crete and back where I made my own bed and did not shave because the fittings were not inviting.

Somehow I could not tune in to Italy. I went from Brindisi to Naples ; visited Pompeii (not nearly so good as I made out in my article !) and stayed a few days at Capri. But the touts, extremely high expenses, and unpleasant weather did not urge me to stay on and visit Sicily.

I went to Paestum, but did not get there. (Irish). I am, even now trying to get a refund on principle. I arranged the trip through Cooks, took the ticket, got up at six on a very cold morning and got as far as Battipaglia, a few hours from Naples, to find that the connection to Paestum was not running because it was the last day of the year. So I had to sit two hours at Battipaglia (a blot of nothingness) then return to Naples. A day wasted and an irritating demonstration of Tantalus. I was too discouraged to try again, but left instead for Paris.

At any rate I read Lady Chatterley's Lover (unexpurgated) at Capri and bought a rather attractive piece of pottery by a German artist who lives there.

I returned to Naples on the same ship as Sir John Simon, but he was not impressed with my presence.

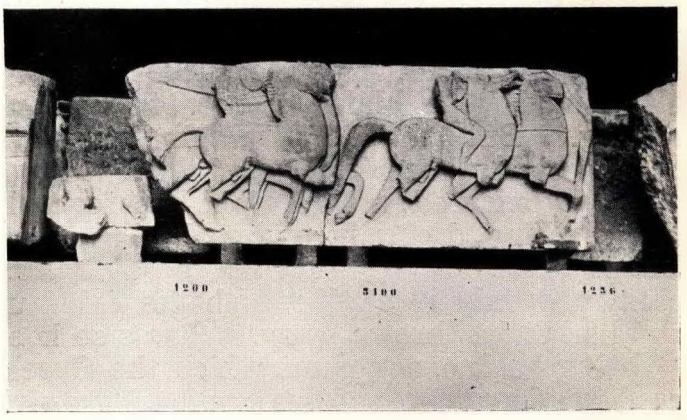
This letter is getting too long so I will conclude by saying that I spent a most enjoyable ten days in Paris, quite a small hotel near the Louvre. I had two long talks with Le Corbusier, he was very charming and enabled me to visit his important works. The new Salvation Army Building is just finished, the Pavillon Suisse at the Cite Universitaire has been completed some months. I can only say that the other "Pavilions" look forlorn and pathetic next to their new young brother. I went out to Garches to Gertrude Stein's house, which is rich in paintings and has a fine setting though on a small site.

The La Roche house in Paris is one of his finest things, and I think one of his own favourites. His work does not get across in photographs. La Roche has a magnificent collection of modern paintings, Leger, Ozenfant, Picasso, Juan Gris, Jeanneret, etc., I nearly swooned at the experience of visiting such a collection. I shall attempt one day some sort of analysis of the peculiar appeal and emotion which Le Corbusier's architectural forms arouse in one. I say his, because they can be attributed to no one else. He was very interested to hear about South Africa and would not believe that Zerohour was printed in Johannesburg. He looked through a copy with sympathy and criticised our various designs, etc.

I struck some very fine things in the Luxembourg and I am following up at present a painter called Gromaire who has one picture there. I bought a limited reproduction of one of his things, "Au Piano" in Paris, very powerful and ruthless, not everyone would like it but it moved me sufficiently to fork out four hundred francs. I have written to Gromaire asking his permission to reproduce one or two of his things. I hope to get a reply. By the way I was invited to contribute a short note for a new book on Le Corbusier and Jeanneret, while I was in Paris.

R.M.

Part of the Frieze from the Siphnian Treasury at Delphi



THE FRIDAY CLUB EXHIBITION

Some friendly but candid comments

A sort of blight seems to have fallen on the Friday Club as indeed some of its members admit. The nostalgia, perhaps, that comes to most movements in this changeable city, when they have been in existence for some time.

In no other way, can I explain some of the pictures at the recent exhibition. It is not that there is no talent. Several of the members have not only talent, but experience. Perhaps they took the exhibition too lightly, though it is true that some of their most conspicuous painters such as S. P. Hodge, have left Johannesburg. Still quite a fair nucleus remains. Of the men, W. A. Stanford and I. H. Lennard have done and are capable of doing much better work than this. Stanford's "Sea of Gallilee" is picturesque but not the picture that he is quite capable of painting. While Lennard's landscapes lack interest, probably because he himself did not find them interesting ?

M. Packer's work is an exception. "The Mill-Pool" is thoughtfully composed and delicately painted. The other two water-colours (one of which is reproduced here) make less impression, in at least one case, owing perhaps to the subject being rather hackneyed, but "Packing Sheds" has an atmosphere and a sense of arrangement. "The Lesson," a figure study in oils, has distinction and suggests a great deal that is not fully expressed. These four pictures seem to me to represent a much higher standard of achievement than I can remember from this artist.

J. Semples' "Captain Moore," is the artist's strongest piece of work. "Figure Study" is not original in subject and somehow suggests a lack of effort on the part of the artist. There is, despite the position, not much repose about the figure study !

E. Middlemiss has not quite succeeded in "The Fowl-Run." The "Fidler" style is not so easily acquired. Parts of "The Spruit" are excellent, but he might have studied his tone values a little more closely. The sky does not come up to the rest of the picture.

Sydney Carter has let himself go in his two exhibits. They are interesting experiments in colour and decoration and show a degree of technical skill that does not, perhaps, obtrude itself at the first glance.

His disciple, T. J. McCaw, has acquired facility and, no doubt, will be able to turn out pictures of the kind shown here with distressing regularity. Probably, if he is prepared to go on painting pretty pictures, he will earn local fame and a little money. But one would like to see him do more than that.

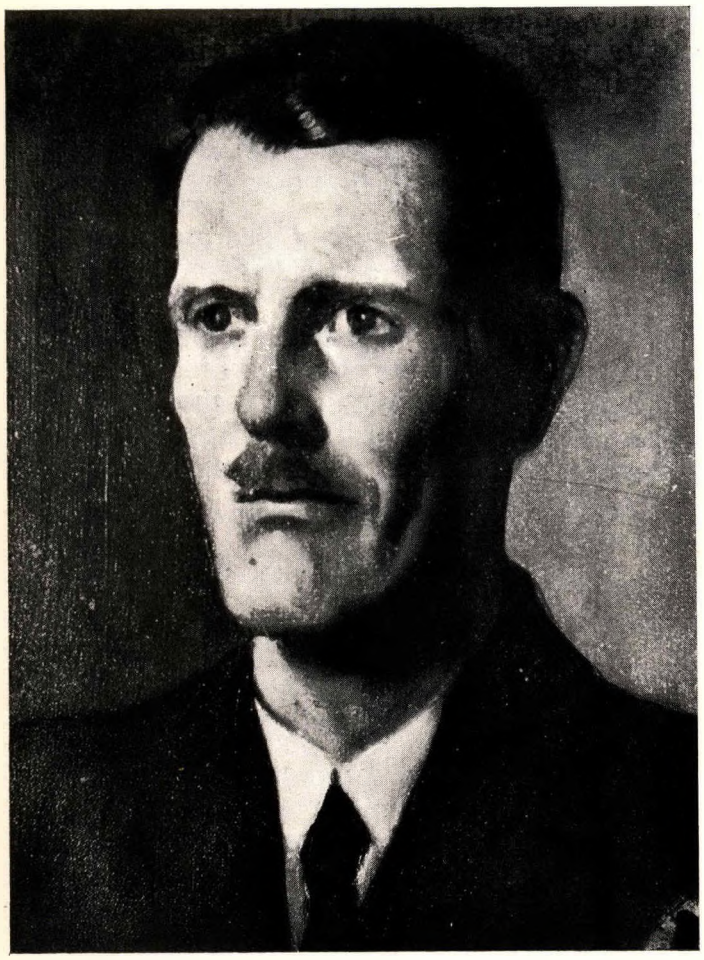
E. I. Fern has a nicely grouped bunch of flowers and a nude which seems to me not forceful enough to cover a certain crudeness in execution. E. Black has a pleasant study of "The Garden Next Door," which shows that her long absence from Johannesburg has not caused her to forget us. Hard work and sincerity of purpose have sensibly improved her technique.

W. J. Stayt has essayed colour and decoration in "Adventure" and "Still-Life." He has enough knowledge to make it a little dangerous. "River-mouth, Isipingo," has its points, but several rather obvious technical faults.

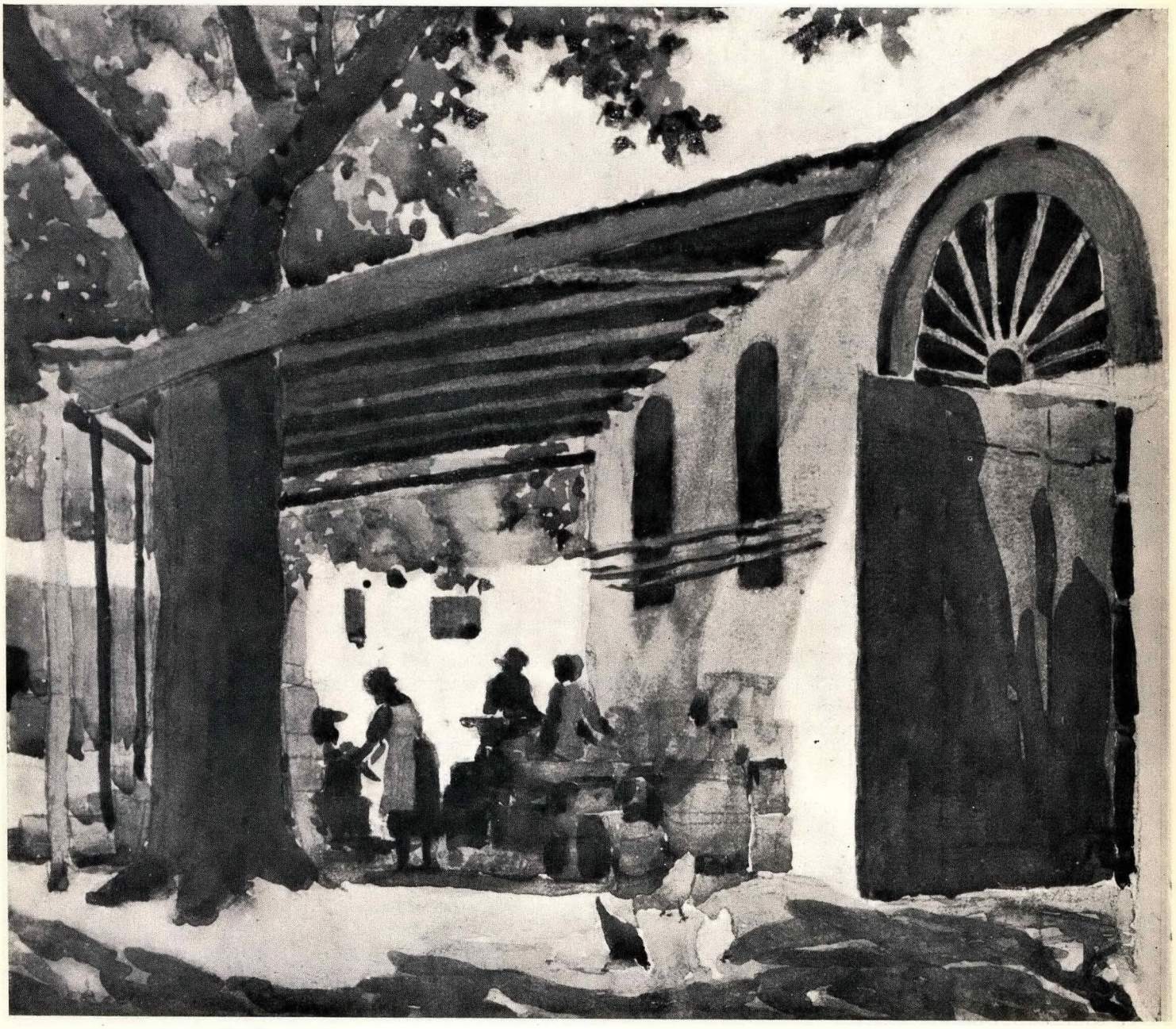
P. W. Lamb has some portraits that suggest the need for more study. He has a facility for likeness and, no doubt, a sense of characterisation, but he will have to study drawing and anatomy still further, if he wishes to become a successful portrait artist, not to say painter.

None of the above comments is intended in an unfriendly spirit. As our only professional club, the Friday Club deserves all encouragement, but it is doing no service to a club which prides itself on being above amateur standard, not to point out some of the failings that many of the members must realise for themselves. Having the responsibility of setting up a standard for Johannesburg, no poor work or second-rate efforts should be allowed publicity. A high endeavour, if only to show what can be done by local artists, should be the aim of every individual member.

D.L.



Portrait J. Semple



PACKING SHEDS. M. PACKER.

MODERN DEVELOPMENTS IN STRUCTURAL STEEL WITH REFERENCE TO BUILDING CODES ●

B. CAPLAN

The modern commercial system introduces the problem into town planning of arranging a large area of floor space within as small an area as possible. It requires all offices and warehouses to be within easy reach of one another. This factor has led to the erection of large blocks of offices from which has developed the skyscraper. As the size of the structure increases, so also must the accuracy in design increase, to ensure that the building will be safe, and also to make it a commercial proposition. For this reason it becomes increasingly necessary to know what loading we are most likely to encounter, how the individual portion of our steel structure will act under this system of loading and what unknown factors we should include in our factor of safety. For the assurance of safety, and for the purpose of guiding the designer, building codes are essential. These are simply codes of rules and standards stipulating limits within which all loads, dimensions, etc., must remain. Various countries and cities naturally have their building codes, which are based mainly on scientific research. For the purpose of enabling these codes to be amended to suit modern tendencies in loading, improvement in materials, etc., the Steel Structures Research Committee has been instituted in England, to investigate thoroughly modern conditions. Their final report will contain the most up-to-date knowledge of Steel Structures from which reasonable rules for practice can be derived.

Most of the steel codes of practice to-day are based on conservative lines. Improvement of materials and a better knowledge of loads to be expected tend to show that most buildings would be too strong. In this paper it is the intention of the author to deal with :—

(a) the loading of a building and method of procedure to ascertain maximum and average loads in office buildings.

(b) Instruments in daily practice for measurement of stress and strain and their methods of operation.

(c) an analysis of riveted and bolted joints.

(d) various codes of practice in comparison to a suggested reasonable code.

1. Investigation of Loads in Buildings.—

The floors and steelwork of an office building must be designed to provide a sufficient margin of strength to permit the occupier to concentrate his furniture and equipment in a reasonable manner at any point he may desire. Two questions immediately arise. How can concentration of equipment be represented numerically for the purpose of comparison ? What is normal and abnormal concentration ? Since the requirements of various tenants are so different, no rigid answer to either question can be found. A survey of a large number of offices is obviously necessary. To carry this out so that statistics could be drawn up is impracticable. Hence the facts disclosed by smaller surveys, such as have lately been carried out, serve as a fair basis for design.

For the purpose of providing up-to-date live loads for various offices and departments, a survey was carried out over a fairly large number of office buildings, by a panel of the Structural Steel Research Committee. The types of offices or departments visited could be classified under the following main heads :

(1) Government Departments.
(2) Structural Engineers.
(3) Consulting Engineers.
(4) Railway Companies.
(5) Finance Companies.
(6) Merchants.
(7) Industrial Combines.
(8) Banks.

● *A paper read before the Students' Section, South African Institution of Engineers*

These were found to be representative of nearly all the types of offices to be found in an office block. The object of the investigation was largely to ascertain both maximum and average loading for various offices as is found in practice. In carrying out this survey each article of furniture was weighed together with its contents on a spring balance, while weights of equipment were obtained from the manufacturer's catalogues. It was also thought necessary to record the area of the individual floors and to locate exactly the positions of the various articles of furniture. This was done by previously obtaining eighth inch detail plans of the floors and inserting in these, in position, each article of furniture drawn to scale, and together with its weight.

Live loads are of little value unless they can be expressed as equivalent uniformly distributed loads. This can be defined as that uniformly distributed load which will produce the same bending moment as the actual load. It was found in all cases, that for floors of over two hundred and fifty square feet in area, the equivalent uniformly distributed load was the total load divided by the area containing it. It could also be exactly calculated, and when this was done the difference was rarely more than five per cent.

In the reduction of the results it becomes necessary to reduce all loads to certain units of area. The units chosen were ten, twenty-five, fifty, one hundred, two hundred and fifty and one thousand square feet respectively. All areas were brought up to one of the above units, the loads upon them being suitably adjusted. Table 1 shows the maximum loading found in the various types of tenancies over the different units of area. The last column gives the average for the whole tenancy.

TABLE I.—HEAVIEST LOAD.

Area in Sq. Feet.	Maximum Loads in lbs/sq. foot						Average for whole Tenancy.
	10	25	50	100	250	1000	
Government Department	168	136	96	52	45	21	11.4
Structural Eng.	95	65	44	30	20	13	5.3
Consulting Eng.	105	85	83	63	63	35	11.5
Railway Companies	120	60	34	34	21	14	7.4
Finance Companies	230	(220)	120	92	41	19	12.3
Merchants	195	119	83	72	48	22	15.6
Industrial Combines	215	150	110	98	75	29	7.5
Banks	235	(230)	(230)	84	48	30	14.0
							General Av.
All tenancies	235	150	120	98	75	35	10.6

The figures in brackets have been disregarded as they are due to intentional combination of safes with a full knowledge of the strength of the floor.

The maximum loads shown in the above table were found to be due, in the majority of cases, to abnormal arrangement of normal office furniture and equipment. For example, in one case forty filing cabinets were found arranged in a square battery over the centre of the floor, while the normal arrangement would have been two rows of twenty across the office. The table also demonstrates the important fact that the intensity of loading definitely decreases as the area supporting it increases. What is also interesting to note is the extremely low average loads found on all tenancies in comparison with the maximum loads.

Records have been taken for attendances in large halls and theatres to ascertain live loads due to people. It was found that in large halls ordered seating led to far higher loads than random crowding. The reverse holds for small halls. In large halls over three hundred square feet in area fifty pounds per square foot is about the maximum likely to be reached. Heavy loading due to people

never occurs in places where there is heavy equipment. The floor space is divided up into small portions unsuitable for crowding but suitable only for small groups. The weight of these is in most cases negligible in comparison with the weight of the equipment. The staff of an office building contribute a load of about one point seven pounds per square foot. This raises the general average from 10·6 lbs. per square foot for equipment only to 12·3 lbs. per square foot for equipment and staff.

The modern tendency is to use steel for office equipment. Steel cabinets and filing equipment are steadily replacing the old wooden ones, both on account of the fireproof nature of the material and on account of larger capacity. Without increasing the outside dimensions of these cabinets the steel ones are definitely of larger capacity, thus leading to increased weight when full. On an average this increase is not greater than thirty per cent. Thief-proof, as well as fireproof safes are approved of as most satisfactory to-day for storing of records and documents. These must of necessity be very large and heavy. The position occupied by such safes on any floor is obviously important, as safes weighing up to four thousand pounds act as concentrated loads. Safes are usually placed in offices in the most convenient positions which might in certain isolated cases cause failure.

The increasing use of machines in offices is also a factor which must affect the value of the live load. Addressing machine are among the most important of these. The machine itself weighs very little, but the small metal stencils which are used are closely packed in cases which, when full, are surprisingly heavy. These stencils are added to from time to time and the tenant fails to appreciate their weight. In many cases boxes of stencils placed one above the other have led to concentrated loads up to six thousand pounds, which is far more dangerous than a heavy safe. The advance of modern methods for compressing paper records also tends to cause a rise in the average loading. This new system enables an increase of forty per cent. of the original weight of paper to be stored in the same area.

The general result of the survey shows the modern tendency of loading in office buildings. It suggests that larger concentrated loads than three thousand pounds should be prohibited on any floor. This would cause very little inconvenience. If, however, it becomes essential to introduce a concentrated load in excess of three thousand pounds, it must be erected on a raft to distribute the load more uniformly. Furthermore, warnings should be printed on all machines tending to cause high concentrated loads. An empirical formula has been suggested which gives a good value for the intensity of live load to be assumed for the design of normal office buildings or blocks of flats.

$$\text{Intensity of loading} = 105 \sqrt[4]{\frac{100}{\text{Area}}} \quad \text{lbs./sq. ft.}$$

The direct results of this survey, i.e., the computed allowable load values for various types of floors and buildings will be discussed in the last section of this paper.

2. Strain Measurements.

All practical calculations and designs are based on the assumption of ideal conditions which are only approximately found in practice. For example, column ends are assumed to bear evenly on their bases, whereas in practice conditions of workmanship which can never be perfect introduce errors. Beam reactions are taken as bearing directly over columns, while actually the connection produces an eccentric load. It is only by very exact measurement of stresses and strains occuring in the various members of a structure while still under construction that we can estimate how great these accidental stresses are, and to what extent they will affect the designed stresses. In America strain measurements were taken on two buildings, the Equitable Building, Iowa, and the American Insurance Union Building, Ohio. It was found that in both cases the observed stresses were greater than the calculations indicated. This fact calls for explanation and the results show the necessity for further investigations on these lines. The first essential for such an investigation are very reliable and accurate measur-

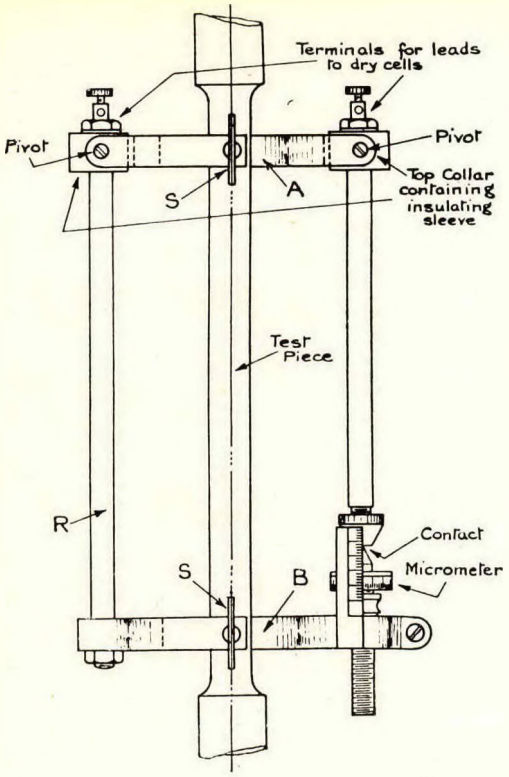


Fig. 1.

ing instruments. A comparison of the instruments in common use to-day with the most modern instruments later described, will show the accuracy and reliability of the modern instrument. The reliability of the latest instruments will enable us to consider the results obtained as the true state of affairs.

Extensometers and strain gauges can be classified under two headings :—

(1) Those measuring the elongation of short bars or wires.

(2) Those measuring the strains set up in columns or beams under load.

These are constructed on three principles :

(1) Micrometer screw principle.

(2) Direct dial reading.

(3) Reading by means of a microscope.

The earlier instruments have been constructed on one of these principles, but later ones have been constructed on a combination of two of these principles.

Of the first class there are various in use. A good example of one of these is Riehle's Improved Extensometer. The arrangement is shown diagramatically in Figure 1. Two frames (A and B) are each fixed axially to the test piece by two hardened steel pointed thumb screws (ss). The left-hand rod (R) is rigidly joined to the lower frame (B) and is pivoted to the upper one (A). The right-hand rod swings from a pivot in the upper frame over the micrometer screw in the lower one. The rods are equidistant from the points of attachment to the specimen, so that when elongation occurs the right-hand swinging rod moves away from the micrometer twice the amount of the elongation. This extensometer can be used on gauge lengths from two inches upwards by having sets of rods for those gauge lengths which are required. Elongations of .0001 inch can be read and electric contacts can be employed to obtain exactly the position of the micrometer when just in contact.

A good example of the second type is the Hurst-Tomlinson extensometer which is shown diagramatically in Figure 2. It consists essentially of two fork-shaped levers (AB and CD) placed at a distance of two inches apart, one directly above the other. The lower lever (DC) has a short projection (EF) at right angles to its length connected rigidly to it, the top end (F) of which acts as a fulcrum for the upper lever (AB). At the other end (C) of the lower lever (DC) is situated the gauge dial. At the corresponding end (A) of the upper lever operates the dial. To use the instrument the pivoted lever (AB) is first firmly clamped by means of a clamping screw at (F). (H) is an adjusting screw, whereby the dial is made to read zero on the scale. The test piece may then be inserted into the forked part and clamped with the four hardened steel pointed clamping screws. The lever (AB) is then unclamped and the specimen can now be inserted into the testing machine. The extensions can be read directly on the dial to a precision of .0001 of an inch.

A good example of measurement of extensions by microscope is the case of Ewings Extensometer. This instrument has been used for a great deal of scientific work in England It is shown diagramatically in Figure 3 on a gauge length of eight inches. Two clips (B and C) are attached to the test piece

(A) by two pointed screws. The lower clip (B) carries the vertical projection (B^1) terminating in a rounded point (P) which engages in a conical recess in the upper portion (L). When the test piece extends, the latter point (P) serves as a fulcrum for the upper clip (C) and the other point (Q) is displaced through a distance equal to twice the extension. This displacement is measured by a microscope attachment to the lower clip (B) sighting on a mark on a rod (R) which hangs from the point (Q) on the upper clip. Readings are taken from a micrometer scale in the eyepiece of the microscope. A screw (L) serves to bring the sighted mark to a convenient point on the micrometer scale. Scale readings can be estimated to .00002 of an inch. A clamping bar is added by which the clips (B) and (C) are held at the correct distance while fixing the test piece. The same instrument has been manufactured for various lengths of test pieces.

Strain gauges can be constructed on very much the same principles only a modification is necessary to enable the gauge to be attached to beams and columns.

An example of a dial reading strain gauge is the Berry Gauge. This instrument is very simple in construction. It is shown diagramatically in Figure 4. It consists of an Invar steel frame (A) to which an Ames dial and two pointed legs (C and D) are attached. One leg (C) is fixed in position, while the other end (D) is pivoted to the frame in such a way that it adjusts itself to change between the gauge points. A rod (E) is continuous with the pivoted leg and forms a bell crank lever with it. The end of the lever operates the Ames dial which gives strain directly.

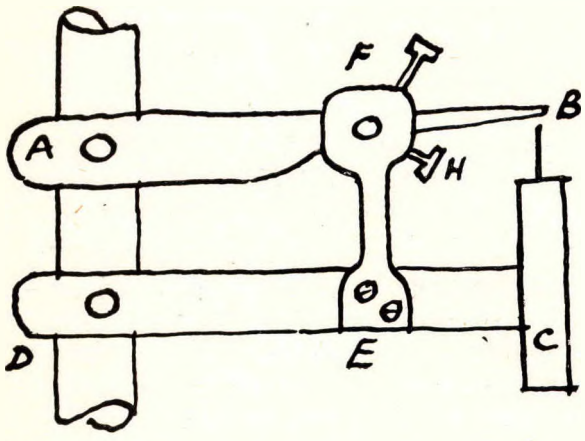


Fig. 2.

The great difficulty found in the use of the above instruments is that they are not sufficiently reliable within small limits. It therefore became necessary to construct a strain gauge which would give, not so much finer readings as more reliable readings. Simplicity in construction seemed to aid in attaining this. A robust instrument was necessary which would withstand shocks. Changes in temperature introduced another difficulty to be overcome. For the purpose of investigating thoroughly the actual stresses set up in a steel building the Steel Structures Research Committee eventually produced a strain gauge which to all intents and purposes gave very satisfactory results.

This gauge is made in two separate portions: (1) extending portion; (2) the micrometer and magnifying portion. The two parts are kept separate to prevent any shocks affecting the micrometer readings. The extending portion is shown diagramatically in Figure 5. It consists principally in two tapered pins (A and B) which fit into two holes drilled in the member under consideration at a gauge distance of twelve inches apart. To the one pin (A) is attached the gauge bar which is free to movement all along its length. It is supported near the other end by a saddle (C) which has a screw by means of which the observer is enabled to raise or lower the end of the bar a little. The bar itself is of such a length so that when fitted there remains a space of 8/1000ths of an inch between its edge and the edge of the pin (B). It is quite obvious that the relative extension between A and B, is the same as that between the end of the bar and the pin (B). This movement can be measured provided there are reliable and sharp edged marks on both the bar and the pin. To provide for this, stainless steel plates are welded on to the end of the bar and on to the top of the pin. For the purpose of providing good marks, a square steel block was made, fitted with a small spring-loaded plunger, to the bottom of which was fitted a small wedge shaped diamond. The

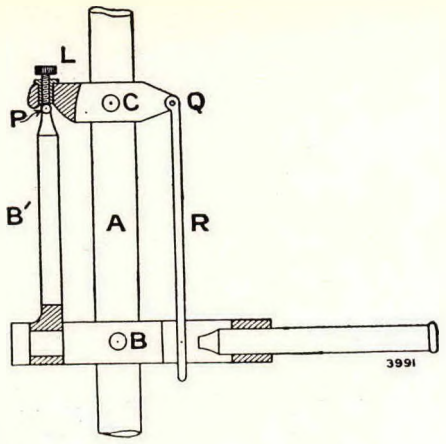


Fig. 3.

end of the bar and the top of the pin were placed under the block and marks were made on the stainless steel plates. These marks were in the form of squares and when the instrument was erected, the diagonals of these square marks would be in the same straight line. The marks were made in this way so that they would have sharp corners and would be identical in size and shape.

The micrometer and magnifying portion consists of a travelling microscope mounted on a small steel table. The microscope carries a graduated scale in the eye-piece. Just below the eye-piece are two shutters, one fixed and one moveable. The moveable shutter may be opened by means of the micrometer screw. The pitch of this screw is designed so that the shutter moves a distance of .00001 inch for one division on the screw head.

To erect this instrument a special jig is used which has two holes in it exactly twelve inches apart. The drill is inserted through these and the two holes, to hold the pins, are drilled in the member under consideration. With this jig the remaining holes can also be drilled, which hold down the surrounding protective casing.

To read the instrument, the surrounding casing is removed and the microscope is strapped on to the member over the gauge. The one shutter is opened slightly and the microscope is moved until a corner of one of the marks is just visible past the edge of the fixed shutter.

The moveable shutter is further opened by means of the micrometer screw until a corner of the other mark is just visible past its edge. By measuring the increase in length between different corners of the marks, three readings can be obtained, the mean of which will give the actual increase.

This instrument has been thoroughly tested. It was erected side by side with various other gauges and in each case the strain measurement was nearer to the value to be expected than any of the others. The curve of stress plotted to a basis of strain was very close to a straight line.

This instrument has many advantages over the others. In the first place it is much simpler in construction and far more robust. It can be erected on a beam or stanchion and left for a considerable time without any fear of its being damaged. Secondly, since the gauge bar can be made of the same material as the beam or column under test, temperature changes do not affect the actual strain readings. Thirdly, the accuracy with which it can be read gives it a definite preference. It gives accurately stresses as low as 100 lbs. per square inch. This instrument is being used very extensively in a special series of tests carried out on the columns and beams of the Geological Museum, South Kensington, for the purpose of establishing definitely the stresses in buildings as compared with those indicated by calculations. The results of these tests have not yet been published ; but when this is done we shall be able to ascertain just to what extent our total stresses are affected by various practical deficiencies.

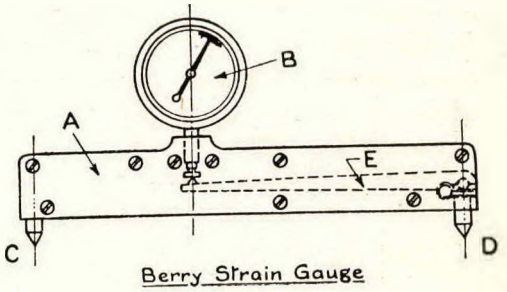


Fig. 4.

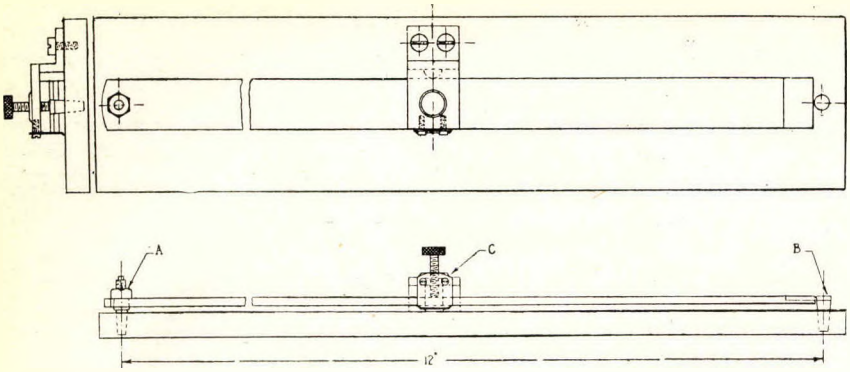


Fig. 5.

3. Riveted and Bolted Joints.

The riveted and bolted joints are very often considered to be the simplest elements in a structure to be dealt with simply by empirical rules. This however, is not found to be the case. It has been shown experimentally that in any joint some of the rivets or bolts take a very large percentage of the load while others take only a small part. Although it is impracticable to design joints with equal partition of loads among the rivets, in accordance with this theory, it may nevertheless lead to a better and more economical arrangement of rivets.

At McGill University, experiments were carried out on riveted splices, to investigate the proportion of load that was taken by the individual rivets in a double cover plate butt joint. The theoretical partition was investigated, the theory being based on the principle of Least Work. The theory also assumed that in any riveted splice, the first row of rivets may be regarded as taking a certain portion of the load out of the main plate say X_1, and transferring it to the cover plate. The second row takes a further portion of the load say X_2 out of the main plate and transfers it to the cover plate. And so on until the last row is reached which takes the last portion of the load Xn out of the main plate, transferring it to the cover plate. Referring to Figure 6, a double cover plate butt joint with a single row of rivets is shown diagramatically. The load in the first rivet is X_1, in the second rivet X_2 and so on up to the Nth rivet which is Xn. If the tension in the joint is F, then the force in the main plate between the first and second rivets is $F-X_1$, between second and third rivets is $F-(X_1 + X_2)$ and finally beteween the (N-1)th and the Nth rivets the force in the plate is $F-\Sigma(X)$. In each cover plate the corresponding forces will be $\frac{X_1}{2}$, $\frac{(X_1 + X_2)}{2}$ and so on up till $\frac{\Sigma X}{2}$ respectively.

Considering all the loads in the rivets as statically indeterminate quantities and applying the principle of Least Work, a number of simultaneous equations involving as variable quantities, the area of cover plates, the dimensions of the rivets, and a large number of other quantities, are obtained. When we have substituted these equations values relating to any particular splice, we can solve for X_1, X_2, etc., which give us the load taken by the individual rivets. It can easily be seen how this theory can be extended to joints having more than a single line of rivets. In that case X_1, X_2, etc., will be the proportion of the load carried by the row of rivets situated at the same positions. Figure 7 shows the proportion of the load taken by each rivet or row of rivets situated in positions (1) (2) (3), etc., on a riveted splice. It will be seen that the row situated at the beginning and the row situated at the end, nearest the junction, take by far the largest portion of the load, while the rows situated in between take a much smaller proportion. By means of the above theory it is shown that if the rivets were absolutely rigid, the first and last rows would take all the load, whereas if the rivets were completely elastic the load would be evenly distributed. In the ordinary practical case rivets are neither completely elastic nor completely rigid, but are something in between, giving this peculiar distribution.

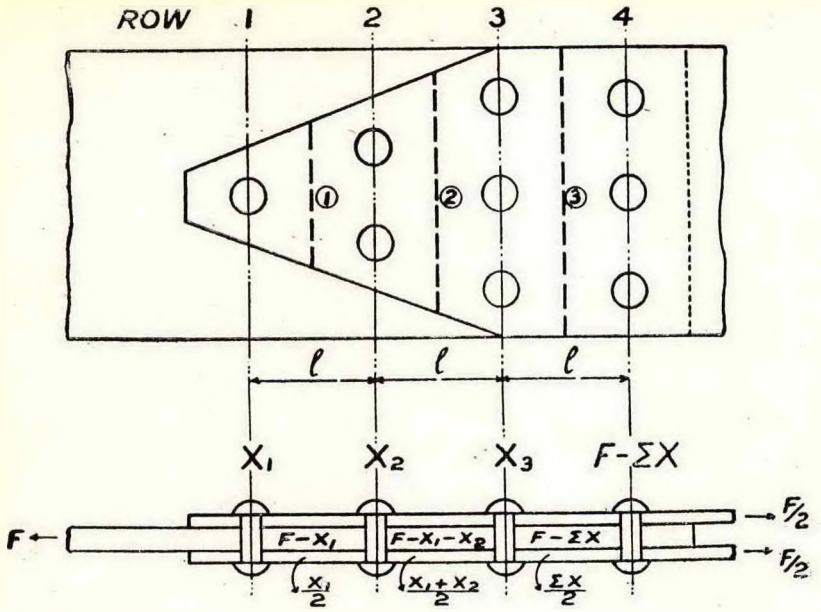


Fig. 6.

From our theory we can also find what conditions must exist for an equal partition of the load among all the rows. The following formula has been derived to give an equal partition of load.

$$a_r = \frac{N}{\Sigma_1^r m} - 1$$

where a_r = Cross sectional area of middle plate. / mean total cross sectional area of cover plate.

N = Total number of rivets in joint.

$\Sigma_1^r m$ = Number of rivets up to part of plate considered.

Thus if we have a splice having nine rivets on either side of the joint arranged in four rows of 1, 2, 3 and 3 respectively, we can substitute in the above equation which gives

$$a = 8 \quad a_2 = 2 \text{ and } a = 0.5$$

This means that between the first and second row of rivets the cross sectional area of the middle plate must be eight times the total cross sectional area of the cover plates, between second and third rows it must be twice the total area of cover plate and between the third and fourth row it must be half the total area of cover plate. This can be effected by either shaping and tapering the cover plate or by using more than one pair of cover plates towards the centre of the splice.

To determine the extent to which this theory holds in practice experiments were carried out on three specimen types of splices :—

(a) a double cover plate butt joint with a single row of rivets.
(b) a double cover plate butt joint with nine rivets on either side of the joint arranged in four rows of one, two, three and three rivets in each row respectively. The cover plates were tapered.
(c) same as (b) except that the cover plates were not tapered.

These three are shown in Figure 8. Short two inch strain gauges were erected on the lower plates between the rows of rivets. The strain in this section of plate gave a good indication of the amount of force which was transferred to it by the rivets. For example, if the strain is known between the second and third rows of rivets, we can find the force in that section of plate. This would be equal to $F-(X_1 + X_2)$. F and X are known, so we are thus able to calculate X_2 which is the load taken by the second row of rivets.

The results of the above experiments were very closely in accordance with the theory. The single rivet in specimen (b) took twenty-five per cent at the working load, while in

specimen (c) it took thirty-one per cent. The last row nearest the junction took forty per cent. of the load in both cases. Figure 9 shows just how closely the experimental results agree in the general case with the results obtained from theoretical considerations.

Specimen (a) was tested with varying numbers of rivets. Figure ten shows the proportion of load carried by the first rivet of a single line of rivets for joints having from two to eight rivets on either side of the junction. It can be seen that the curve becomes practically horizontal at five rivets. This shows that no matter how many rivets are added after the fifth rivet the same proportion of load is taken by the first one. Consequently the rivets towards the middle are becoming practically idle. So we can safely conclude from the foregoing that a better splice would be obtained if the cover plates were kept short and also if a larger proportion of available rivets were arranged nearer the ends.

Very similar experiments to the above were carried out on black bolts which showed that they acted in very much the same way as rivets. But the partition depends on the tension in the various bolts. An attempt was made to tighten them all up to the same tension. To measure the tension in the bolts, a simple instrument shown diagramatically in Figure 11, was constructed. This consists of two arms (AB) and (CD), to the bottom of which is ground a sharp point. These two points bear on a metal rod (P) extending between them. To the centres of the arms are attached another pair of sharp points between which the bolt is fitted. At the top the two arms are bent so as to overlap each other, and firmly wedged between the two is a small roller to which is attached a mirror. Any extension in the bolt causes the roller to turn. A light reflected from the mirror on to a scale registers the amount. The whole instrument is held together by small springs. By means of this instrument a fairly even tension was obtained. The partition of the load in this case was found to be very much the same as found in the case of the riveted splice.

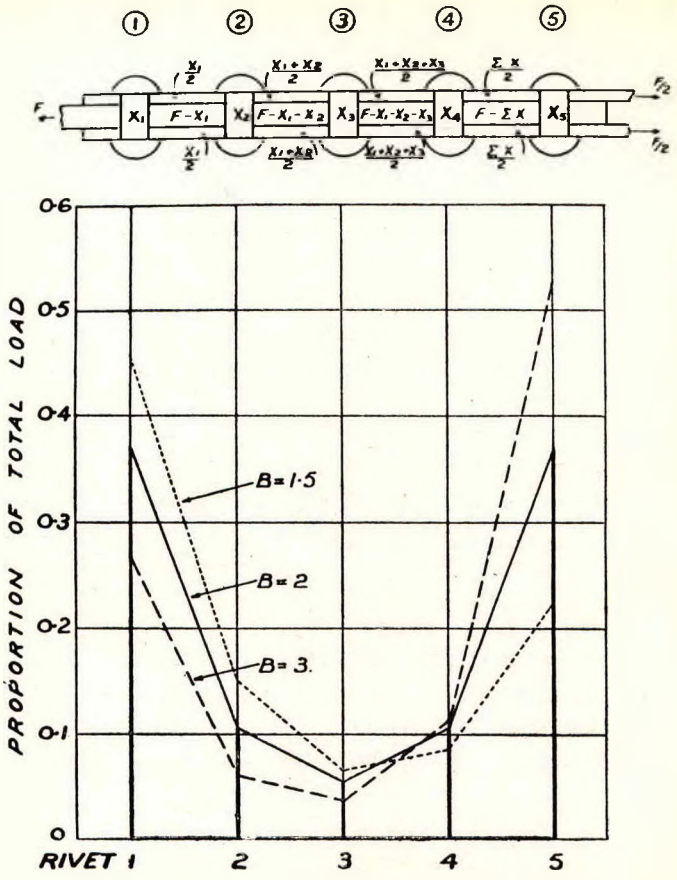


Fig. 7.

In the use of black bolts, the phenomenon of slip was found. When bolts are fitted, a certain amount of clearance is allowed in the bolt holes. Since the bolts do not fill out the holes, at a particular load the friction between the plates will be overcome, and the plates will slip, throwing the bolts into a state of shear. This phenomenon is not apparent in the riveted joint as the rivets tend to fill out the holes when being riveted over. Experiments have been carried out to find what proportion of the working load the slipping load is. The results have been far too erratic to be of any value. Consequently it would be best to avoid bolted joints in such places where the effect of slip will cause large deformations, and to limit their use to connections where slip does not take place or is of no effect. For example, bolts would probably be used in a partly shop riveted and field bolted beam and stanchion connection.

The above phenomenon of slip leads us to the question whether friction aids the rivets or bolts in resisting separation at the working loads. When plates are riveted or bolted together, the rivets or bolts are put into tension resulting in a fairly high pressure between the plates. The phenomenon of slip demonstrates that before the rivets or bolts are put into shear, friction must first be overcome. There are very good reasons to believe that at the working load the bolts are not fully stressed and that friction is aiding the bolts to resist the load. That a large frictional force does exist is not disputed, but to what extent it aids in resistance to shear is not fully known. Experiments have, however, been instituted to investigate this matter more fully. The coefficient of friction between plates, under varying conditions will also be investigated. A fair average value at present accepted is ·36. The great difficulty to obtain anything definite is the uncertainty as to the exact amount of tension in rivets and bolts.

It is often necessary to use rivets in positions where they will be in tension as well as shear. In Great Britain this has been avoided due to the fact that the initial tensile stress of the rivet was unknown. Recent experiments carried out in Germany, United States and Canada have shown that rivets loaded in tension on a joint are capable of standing a tension equal to and often exceeding the tensile strength of the material of which the rivet is made. The reason for this is that the application of tensile load decreases the pressure between the plates but does not add to the tension on the rivets until a load is reached which exceeds the initial tensile load of the rivets. At first this fact may appear to be a fallacy, but let us consider the example of a rigid plate to which a bracket is riveted. When the bracket is loaded the top rivets above the Neutral Axis are thrown into tension. Supposing the tension in the rivets is T_1 giving rise to a pressure of P_1 between the plates. Now suppose the tensile external force applied by the bracket is P^1. Considering the forces acting on the bracket plate alone before the tensile load is applied, we have for equilibrium of the plate

$$T_1 = P_1 \quad (1)$$

Suppose now that the pressure is reduced to P_2 by the application of the tensile load P^1 giving us that

$$P_1 - P^1 = P_2 \quad \therefore P_1 = P^1 + P_2$$

Substitute in equation (1) we get :—$T_1 = P^1 + P_2$

Thus we see that P^1 and P_2 are two variables the sum of which is a constant equal to T_1. When P_2 becomes zero then $P^1 = T_1$. Hence no extra load is put on to the rivet until the pressure between the plates is first removed. All tensile load applied after the pressure becomes zero is then added to the initial tensile load in the rivet.

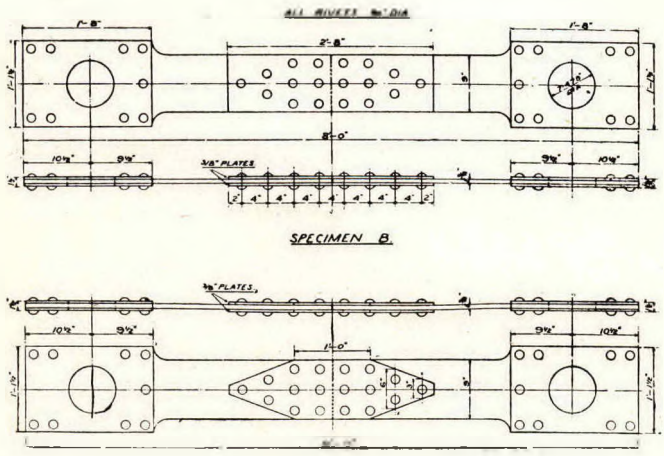


Fig. 8.

The fear that the heads of rivets may fail under a tensile load is also shown to be groundless according to experimental results. An empirical formula based on experimental evidence giving the allowable tension on rivets is suggested by C. R. Young and W. B. Dunbar in their paper "Rivets in combined tension, shear and flexure." Can. Eng. 1925.

Most of the above experiments were carried out at the Building Research Station in England. For the purpose of investigating strains in a building structure under varying conditions of load, an experimental steel frame was built up. It was loaded by means of water tanks which could be moved from place to place, the tanks being filled or emptied according to the load required. Investigations are also being carried out on the effect of rigidity of connections on the stresses in the structure as a whole. The result of this investigation may have a direct bearing on all modern steel building codes.

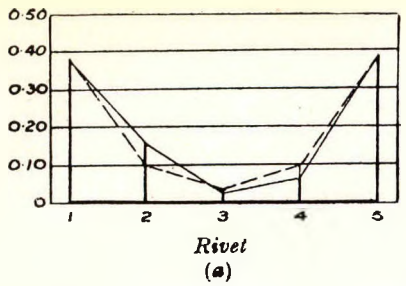


Fig. 9.

Only a few of the problems of riveted joints have been dealt with. The action of such joints under eccentric loading and their behaviour under repeated or alternating loads are still subjects for investigation. The experimental data outlined above should give a clearer idea of the action of various parts of a structure, thus making it possible to design details in a more rational manner, and also to increase the allowable working stresses. The results, which will be published in the final report of the Steel Structures Research Committee, will probably be incorporated in most building codes, which will be controlled by much more stringent regulations.

4. Columns and Struts.

The question of strut loads has always been a difficult one. Various formulae have been brought forward which have satisfied certain experimental conditions. These are found to vary to an extent of about one hundred per cent. from each other under certain circumstances, which is not a very satisfactory state of affairs. Two formulae, however, are found to give fair results, embracing most of these cases :—

(1) Curvature formula, which considers the eccentricity of a column as an initial curvature in the column :—

$$p = \frac{p_1 \pm (n \pm 1)p_e}{2} - \sqrt{\left(\frac{p_1 \pm (n \pm 1)p_e}{2}\right)^2 - p_1 p_e}$$

where p = load in pounds per square inch.
p_1 = maximum allowable stress.
p_e = Eulerian load in pounds per square inch.
n = measure of initial curvature.

(2) Eccentricity formula :—

$$\sqrt{\frac{48E\left(\frac{\rho_1}{\rho} - 1 \pm \frac{ae}{k^2}\right)}{5\rho_1 \pm \rho\left(\frac{ae}{k^2} \pm 5\right)}}$$

The second formula also gives a fair result but it applies best in struts in trusses :—

$$\rho = \frac{\rho_1}{1 + \frac{ae}{2k^2}\sec\frac{lw}{EK^2}}$$

There is still, however, very little information available with regard to the values to be assumed for equivalent lengths of columns for different conditions of end fixing. Thus all designers are very conservative in the designing of columns, and all building codes tend to be very much on the safe side. Very little is really known about columns and building codes must be conservative to safeguard the public.

It is interesting to compare the curves suggested by various institutions and committees of $\frac{L}{K}$ plotted against permissible load. Figure 12, Table 2 shows five curves as suggested by the following :—

(1) Institution of Structural Engineers.
(2) British Engineering Standards Association.
(3) Prussian Building Regulations.
(4) Curative formula n= 2·36.
(5) American Institute of Steel Construction.

From these curves it can be seen that for values of $\frac{L}{K}$ between eighty and one hundred and sixty (which are the usual limits in practice) all these curves lie very close to each other. Beyond these limits there is a divergence. It is seen that curve (2) follows a straight line law while curve No. (1) limits the maximum stress for any value of $\frac{L}{K}$ to six tons per square inch. Curve No. (5) limits this value to 6·6 tons per square inch.

In South Africa, curves No. (1) and (2) which consist of straight lines are largely favoured. Between normal working limits the values of loading are about the average while simplicity in working with straight line formulae are also in their favour.

5. General discussion and comparison of Building Codes.

The results of the survey of floor loading described in Section 1 are best discussed here in relation to building codes. The results have shown that for the purpose of calculating loads on foundations, pillars, walls and beams in a building, the minimum superimposed load on each floor should be in accordance with the following :—

	lbs./sq. ft.
Rooms used for domestic purposes Hotels, bedrooms, hospital rooms, wards, etc.	40
Offices and floors above entrance ..	50
Offices and floors below entrance ..	80
Churches, schools, reading rooms, art galleries	70
Retail shops and garages for light cars	80
Assembly halls, gymnasia, light workshops, public spaces in hotels, hospitals, etc., staircase landings, theatres, cinemas, restaurants and grand-stands	100
Warehouses, bookshops, stationery stores	200

On all roofs inclined at angle of more than twenty degrees to the horizontal a load of 15 lbs. per square foot of surface should be assumed acting normal to the surface.

It has also been found that for the purpose of calculating the total load of the building of more than two storeys, a reduction in superimposed floor loads can be allowed as follows :—

Topmost floor	no reduction in superimposed load.
1st storey below topmost floor	10% ,, ,, ,, ,,
2nd ,, ,, ,, ...	20% ,, ,, ,, ,,
3rd ,, ,, ,, ...	30% ,, ,, ,, ,,
4th ,, ,, ,, ...	40% ,, ,, ,, ,,
All succeeding storeys	50% ,, ,, ,, ,,

These reductions can be assumed on all floors excepting those which carry 100 lbs. per square foot or more.

From these results we are now in a position to compare these findings with the actual existing building regulations with regard to floor loads in England and the British Dominions. Figure 13, Table 2 gives the prescribed live loads which may be taken on the floors of various buildings according to the codes of :—

(1) London County Council.
(2) New York.
(3) Scotland.
(4) Melbourne (Australia)
(5) Auckland and Wellington (New Zealand).
(6) Johannesburg.

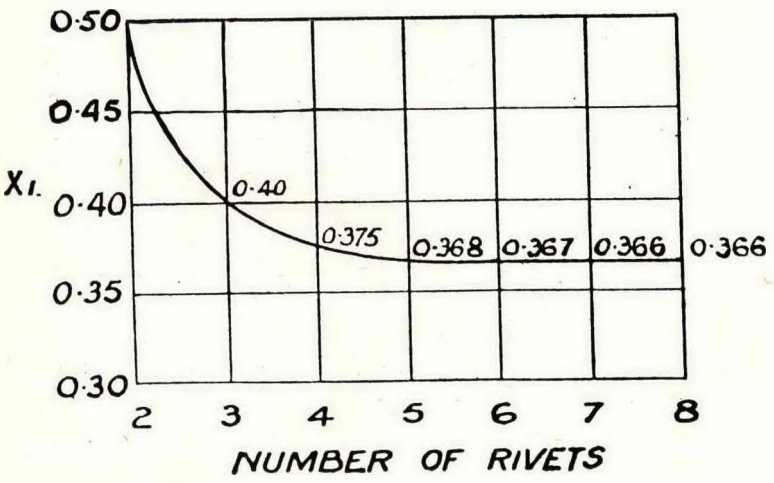


Fig. 10.

New York has the most modern code and has been inserted for comparison. This table gives the prescribed loads as far as these loads given in the various codes could be classified under common headings. Generally, we see that New York prescribes about the lowest loads which are very close to those indicated by the Survey. Johannesburg comes next with loads somewhat higher than New York, while London County Council and Scottish regulations are about the highest. For office floor loads New York specifies 50 lbs. per square foot ; Johannesburg, 56 ; while London County Council specifies 100 lbs. per square foot. For theatres, New York requires 75 lbs. per square foot ; while Mel-

bourne is high at 140. Scotland stipulates an excessive value of 180 lbs. per square foot. Retail shop floors carry in New York 75 lbs. per square foot ; while in Melbourne 140 lbs. per square foot is required. For warehouse floors New York stipulates 120 lbs. per square foot ; while the London County Council and Scotland stipulates 224 lbs. per square foot nearly twice this amount.

All the codes allow a reduction in live loads to be assumed when calculating extreme loads on foundations and pillars. Figure 14, Table 3 gives the percentage of live loads which must be assumed on each floor when these are calculated. From this it is seen that all excepting Melbourne and Adelaide allow a reduction up to fifty per cent. Thus in calculating the extreme load on foundations and columns of a building of say thirty or forty storeys in America, from the eighth floor below the roof and downward only fifty per cent. of the maximum superimposed floor load would be allowed for.

Regulations for design in Steel.

A. **Materials.** All codes lay down minimum strengths for two types of steel, structural steel and rivet steel. For structural steel the ultimate strength must lie between twenty-five and thirty-one tons per square inch, with an elastic limit of not less than half ultimate strength. For rivet steel the ultimate strength must be between twenty-one and twenty-six tons per square inch with an elastic limit of not less than half the ultimate strength.

B. **Wind Pressure** In London a building exposed to wind load must be designed to resist a pressure in any horizontal direction of not less than thirty pounds per square foot of the upper two thirds of its surface. In New York this figure is twenty pounds per square foot. In general, if the height is less than two and a half times the width, wind pressure may be neglected. In Johannesburg all structures exposed to wind shall be designed to resist the following pressures :—"If the vertical plane surface exposed to wind is less than one thousand super feet 35 lbs. per square foot. If more than one thousand but less than two thousand super feet, 25 lbs. per square foot. If over two thousand super feet 25 lbs. per square foot." In no case shall the overturning moment of the wind exceed seventy-five per cent. of the moment of stability.

C. **Columns** In America the maximum value for slenderness ratio of any column, i.e., $\frac{L}{K'}$ is one hundred and twenty while in a common clause in the rest specifies that columns shall have a maximum unsupported length not greater than forty times the least lateral dimension. Melbourne, Adelaide and Johannesburg stipulate that $\frac{L}{K}$ for any column shall not be greater than one hundred and sixty. In Canada, $\frac{L}{K}$ must be less than one hundred and thirty.

Very few codes give any suggestion with regard to the degree of end fixing of columns. Johannesburg simply states : "All metal columns shall be properly spliced or connected in each floor in such a way that the portion of the column between any two floors may be considered as a column with fixed ends. Figure 15, Table 4, gives values of permissible stresses in tons per square inch for various values of $\frac{L}{K}$ Auckland and Wellington state that all permissible loads for columns must be calculated from the Rankine Formula, which assumes $f_{max} = 40{,}000$ lbs. per square inch. Assuming a factor of safety of four we have :—

$$P = \frac{1{,}000}{1 + a\left(\frac{L^2}{K}\right)}$$ (a depends on end fixing).

The Steel Structures Research Committee suggest that all columns between floors should be considered as having an effective length of ·7 times distance between floors, in which case the ends are assumed as being free.

D. **Girders.** In London, compression flanges of girders must be secured against buckling when the length exceeds 30 x width. The Dominions follow the London County Council in this. Sydney, however, adds that the gross area of tension and compression flanges shall be equal.

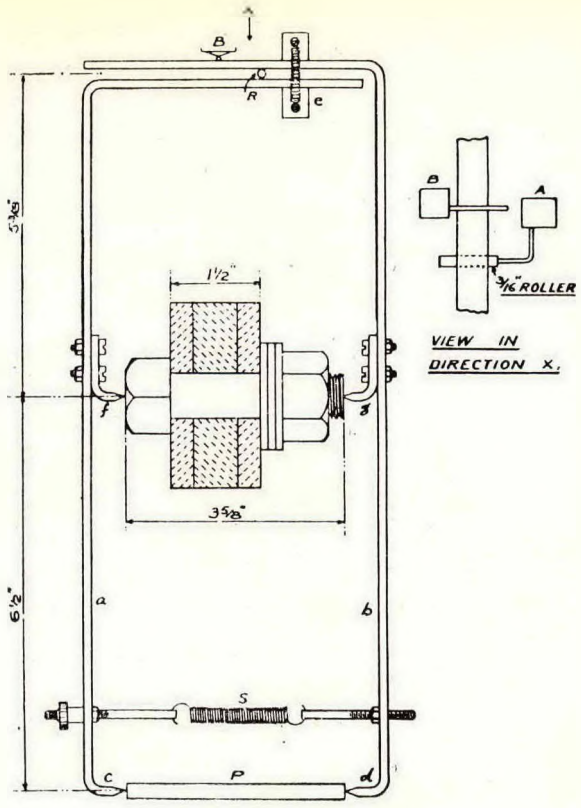


Fig. 11.

E. **Stiffeners.** In all cases where the depth of web of a girder exceeds 60 x its thickness, stiffeners must be provided. New York and Wellington require them to be 120 x thickness of web apart, and must be provided at supports and under concentrated loads. Johannesburg states that the maximum width apart of the stiffeners shall be two girder depths.

F. **Rivets.** The minimum pitch of rivets in all codes is three rivet diams. The maximum pitch varies. In London the maximum pitch is 16 x thickness of thinnest plate. In New York it is six inches. The minimum distance from the centre of a rivet to the edge of the plate in London is three times the radius of the rivet while in New York it varies from three-quarter inch for half inch rivets up to one and three-quarter inch for one inch rivets. The use of welding in structural steel is on no account allowed in London or New York.

Conclusion. The larger towns in South Africa are more and more following the cities of Europe and America in respect of its buildings. The large city blocks of offices and flats are steadily replacing the older and smaller buildings. Although the reinforced concrete structure is to-day the most popular, the day is not very far off when the Pretoria Steel Works will be supplying structural steel for use in South Africa. When this day dawns we should be well fortified with information in regard to steel structures to enable us to formulate steel codes on a very rational, yet safe, basis.

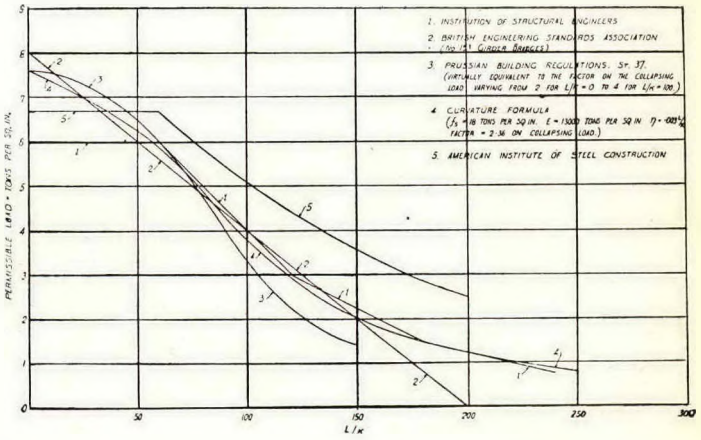


Fig. 12.

HEAVIEST LOADING.

Area in Sq. ft.	Maximum Loads in Lbs./Sq. ft.						Average Over Whole Tenancy.
	10	25	50	100	250	1000	
Government Department ..	168	136	96	52	45	21	11.4
Structural Eng.	95	95	44	30	20	13	5.3
Consulting Eng.	105	85	83	63	63	35	11.5
Railway Companies	120	60	34	34	21	14	7.4
Finance Companies	230	(220)	120	92	41	19	12.3
Merchants	195	119	83	72	48	22	15.6
Industrial Combines	215	150	110	98	75	29	7.5
Banks	235	(230)	(230)	84	48	30	14.0
							General Average
All Tenancies	235	150	120	98	75	35	10.6

FIGURE 13—TABLE 2.

PRESCRIBED LIVE LOADS ON FLOORS IN POUNDS PER SQUARE INCH.

	L.C.C.	New York	Scot-land	Mel-bourne	Auck-land & Welling-ton	Canada	Jo'burg	S.S.R. C.
Domestic	70	40	70	100	69	40 (3000)	56	40
Offices	100	50 (2000)	–	84	70	80 (4000)	56	50
Hotels	–	–	180	70	70	80 (4000)	56	50
Public Buildings ..	–	–	180	–	–	–	–	70
Schools	–	60	180	–	100	60 (3000)	–	70
Theatres	–	75	180	140	112	80 (4000)	–	100
Retail Shops	–	75	–	140	112	60 (4000)	–	80
Ballrooms	–	–	180	180	150	–	–	100
Libraries	–	–	180	–	–	80 (4000)	–	100
Warehouses and Workshops ..	224	120	224	168	150 light / 224 heavy	120 upwards	112	200
Garages	–	100	–	–				

N.B.– Figures in brackets represent a concentrated load.

FIGURE 14—TABLE 3.
ALLOWABLE PERCENTAGE OF LIVE LOADS.

	L.C.C.	New York.	Melbourne and Adelaide	Auckland and Wellington.	Sydney and Johannesburg.	S.S.R.C. Proposed.
Roof	100	100	100	100	100	100
1st floor below	100	85	100	100	100	100
2nd	95	80	95	95	95	90
3rd	90	75	90	90	90	80
4th	85	70	85	85	85	70
5th	80	65	80	80	80	60
6th	75	60	75	75	75	50
7th	70	55	70	70	70	50
8th	65	50	65	65	65	50
9th	60	50	60	60	60	and on
10th	55	and on	55	60	55	
11th	50		50	60	50	
12th	50		45	and on	50	
	and on		and on with same reduction			

FIGURE 15.—TABLE 4.
PERMISSIBLE STRESSES IN COLUMNS.

$\frac{L}{K}$	L. C. C. Ends Free	L. C. C. Ends Fixed	New York	Johannesburg	Sydney	Adelaide	Auckland
20	4.0	6.0	6.7	5.85	6.52	6.0	4.24
40	3.5	5·5	6.7	5.40	5.89	5.5	3.68
60	3.0	5.0	6.7	4.96	5.27	5·0	3.02
80	2.5	4.5	5.9	4.51	4.64	4.5	2.41
100	2.0	4.0	5.2	4.06	4.02	4.0	1.92
120	1.0	3·5	4.5	3.62	—	3.5	1.53
140	0.0	3.0	—	3.17	—	3.0	—
160	—	2.5	—	2.72	—	2.5	—
180	—	1.5	—	—	—	—	—

President's Report.

Bloemfontein, O.F.S.,
8th February, 1934.

Gentlemen,

I have much pleasure in welcoming you here to the Seventh Annual General Meeting of this Institute and in submitting my report for the year ending 31st December, 1933.

MEMBERSHIP.

Our numbers now total twenty-one, through the transfer of Mr. Willoughby Williams from the Cape Institute, and of the following Kimberley Architects :—Messrs. W. M. Timlin, C. Timlin, and G. F. Wright. I regret that we are to lose Mr. H. J. Louw, who now resides in the Cape Province.

COMMITTEE MEETINGS.

Regular meetings of the committee were held during the year, numbering eleven and the attendances thereat were as follows :— H. A. C. Wallace, ten ; H. Fyvie, three ; F. W. Masey, eleven ; H. G. E. de la Cornillere, nine ; W. W. Tonkin, ten.

Mr. Fyvie resigned from the committee and his office of Vice-President on October 14th, having left for Springs. These posts have not been filled.

HON. SECRETARY.

Miss O. Mosley resigned at the end of February and since then Mr. Tonkin has carried out the duties of Hon. Secretary and Treasurer in addition to his work as a member of Committee.

COMMITTEE'S ACTIVITIES.

This year has been busier than usual, as the committee has, amongst other matters given attention to the following :—

(a) Transfer of Kimberley Architects to the O.F.S. These gentlemen were registered in the Transvaal but were too far distant from Johannesburg or Cape Town to keep in close touch. Their interests and problems are similar to ours, and eventually the transfers were effected.

We have offered them one seat on this committee and this Institute will pay up to five pounds five shillings per annum towards travelling expenses in attending meetings. We heartily welcome our new members from Kimberley.

(b) Plans submitted to the Bloemfontein Municipality signed by persons not registered as architects.

Our contention that this unsatisfactory feature was increasing is borne out by figures obtained by the Hon. Secretary after a long search which are as follows :—

1930	142	Plans signed by Architects ; Total value, £135,978.
	98	Plans signed by others ; Total value £54,594.
1931	77	Plans signed by Architects ; Total value, £86,142.
	69	Plans signed by others ; Total value, £44,524.
1932	36	Plans signed by Architects ; Total value, £22,601.
	42	Plans signed by others ; Total value, £11,056.

These figures were placed before the Municipality, and as members know from the circular issued by the committee, the result of our interview was highly satisfactory.

(c) On the committee's behalf Mr. Masey had several interviews with the Receiver of Revenue regarding persons who contravene the Act by doing the work of an architect by preparing plans, etc. In future the Receiver of Revenue will in his discretion insist on a full licence being taken out, and in default will prosecute offenders.

A round table conference was held with the Master Builders' Association on the same question and all members of the Master Builders' Association have been circularised by their executive with definite instructions not to prepare plans for their clients but to refer them to practising architects in every case.

(d) Your committee has requested the Central Council to advocate a policy of closer co-operation between the S.A. Institute and the Institution of Municipal and County Engineers believing that this will benefit both Institutes and the public.

(e) Hearing that the Transvaal Institute intended to give evidence before the Provincial Finance Commission in Bloemfontein in October regarding the Provincial Government work, your committee arranged that the commission take evidence instead, from a joint delegation from all the provinces. A very successful joint conference took place here on October 21st with the result that a unanimous memorandum was drawn up containing the opinions of all provinces, and this was presented to the Commission on 22nd October.

(f) In October two members of the committee had an interview with Senator Clarkson, Minister of Public Works, during his short visit to Bloemfontein, and were very courteously received.

(g) Further to the foregoing, a letter has been sent to the O.F.S. Administrator, and is receiving attention, definitely requesting that all his Provincial Architectural work be apportioned to private practitioners.

It is gratifying to record that some progress at least has been made this year in matters of such importance to our profession.

(h) R.I.B.A. matters, etc.—Our thanks are due to the President in Chief for obtaining from the High Commissioner copies of the special issue regarding the opening of South Africa House, and still more for obtaining from the R.I.B.A. a free gift to all the four Provincial Institutes of all R.I.B.A. publications now in print. This gift is valued at about £50, and it will form the nucleus of the Provincial Architectural Libraries. No doubt the incoming committee will arrange for housing the O.F.S. share of this gift and for its loan to members under suitable conditions.

THANKS.

I desire to record my thanks to the Vice-President, Committee and Hon. Secretary for their assistance during my year of office, especially as the work undertaken has been more than usually heavy.

FINANCE.

Although our Revenue was almost similar to last year, when we had a deficit of £7 6s. 10d., we finish this year with a credit balance of £41 19s. 8d. Outstanding subscriptions amount to £36 19s. 6d. of which £15 15s. should be recovered.

The incoming Committee may have to write off £21 4s. 6d. and take steps to remove the defaulters from the O.F.S. Membership roll and thus avoid the further payment of Central Council levy on their account and an ever-growing amount for outstanding subscriptions.

ANNUAL DINNER.

It is felt that this matter should be discussed by members at this general meeting.

CENTRAL COUNCIL.

Your representative to the Central Council is Mr. Masey, with Mr. Fyvie (and later, Mr. Tonkin) as alternative. Mr. Masey was unanimously elected as President-in-chief for the year, and I am sure that we all extend to him our congratulations on his signal and well-deserved honour. It is scarcely necessary to add that our relations with the Central Council have been conducted without friction.

The President-in-Chief permits me to state that it is hoped to obtain the insertion of Clause 3 (c) in our Private Act by approaching Parliament at an early date.

SUBSCRIPTIONS.

Owing to the depression it proved rather difficult to collect these in some cases, but it is hoped that all but two of the outstanding amounts will be wiped off in a few months.

GENERALLY.

I sincerely trust that we have seen the last of the depression which has hampered and discouraged us during the past two years and I hope that we shall all get our fair share of that prosperity which, it is said, is awaiting us just round the corner.

In conclusion I wish to thank all the members of this Institute who, nothwithstanding the hard times, have cheerfully met their obligations and have supported me in carrying on our work, and it is my sincere hope that the result of our labours during the past year will be to the betterment of all the members in the near future.

H. A. C. WALLACE, President.

THE TRANSVAAL PROVINCIAL INSTITUTE

COMMITTEE'S ANNUAL REPORT.
For the Year ended 31st December, 1933.

To the Members of the Transvaal Provincial Institute.

Your Committee has pleasure in submitting this, the Seventh Annual Report, for the year ended 31st December, 1933, together with the Annual Accounts and Balance Sheet.

COMMITTEE PERSONNEL AND MEETINGS.

Twelve ordinary and five special meetings of the committee have been held in the period under review. The record of attendances at these meetings is given at the end of this report.

During the year Messrs. Harold Porter and J. Lockwood Hall resigned from the Committee and their places were filled by the appointment of Messrs. G. Moerdijk and G. M. Harrison.

Your Committee has been ably assisted in its work by Sub-Committees on Finance, Practice, By-Laws, Art and Education and the Journal and the thanks of the Institute are extended to the members who have acted on these sub-committees.

A Special General Meeting was held on the 8th April last year on the requisition of a number of members.

Several matters in connection with the working of the Act and voting powers of members were discussed and recommendations made for the attention of the Committee which have been duly dealt with.

An unofficial meeting of Salaried Members was called by the Vice-President, Mr. Gordon Leith for the 18th July to discuss the interests and position generally of salaried members in the Institute. Only seven members attended this meeting and after discussing several matters the meeting unanimously expressed its full confidence in the Committee.

An informal dinner and cabaret was arranged on the initiative of Mr. Gordon Leith and was held at the French Club on Thursday, the 23rd November. The object was to bring members and their wives and friends together and the function was an unqualified success and left the impression that such gatherings should be arranged more frequently.

MEMBERS ROLL.

Since the last report was issued nine new members, Messrs. C. E. Cawse, P. S. Dykstra, A. C. Fair, John Fassler, A. R. Martin, W. Percik, H. W. Reid, C. J. Slade and I. H. Smail, have been elected, whilst Mr. Norman Harvey was transferred from the O.F.S. to the Transvaal Institute.

Three members, Messrs. W. M. Timlin, C. Timlin and G. F. Wright have transferred from this Institute to the O.F.S. Institute, and one Mr. D. A. McCubbin has transferred from the Transvaal to the Natal Provincial Institute.

Three members, Messrs. H. A. Collins, F. Taylor and E. Youatt have resigned and five members Messrs. N. L. Brampton, C. A. P. Gerntholtz, J. G. Laver, Walter Reid and J. H. Vincent, died. At the end of the year there were two hundred and sixty-five members on the Register classified as :—

Practising	116
Salaried	105
Retired	30
Absent from the Union ..	14
	265

OBITUARY.

Your Committee records with regret the deaths of Messrs. N. L. Brampton, C. A. P. Gerntholtz, J. G. Laver, Walter Reid, F.R.I.B.A., and J. H. Vincent.

Mr. Walter Reid who died on the 29th March, 1933, was the first President of the Association of Transvaal Architects and was again President in 1910, and 1915, and a Trustee of the Benevolent Fund from its establishment in 1914, until the time of his death. He was one of the pioneer Architects of Johannesburg and universally known and respected, and never spared himself in striving for the advancement of the profession.

Mr. N. L. Brampton, whose death occurred on the 29th May, 1933, at the early age of thirty-three was educated at St. John's College, Johannesburg and the University of the Witwatersrand. He was a practising member of the Chapter of Quantity Surveyors and a retired member of this Institute at the time of his death.

Mr. J. G. Laver, who died on the 3rd March, 1933, was trained as an Architectural Draughtsman and Engineering Assistant to his father, Mr. Thomas Laver, a well-known contractor and engineer at Bath, England, 1882 to 1902. He took a first-class Diploma at the South Kensington Science and Art Department for Architectural Drawing and Building Construction in the Elementary, Advanced and Honours Examinations. He was Chief Draughtsman to the Public Works Department, Transvaal, from 1901 to 1903, Assistant Engineer, 1904 to 1924, and Assistant District Engineer, 1924 to 1927.

Captain J. H. Vincent, whose death occurred on the 3rd June, 1933, was born in Plymouth, England, in 1876. He was educated at Plymouth College, articled to Messrs. King and Lister, Architects, Plymouth and practised as an Architect and Surveyor in Plymouth for many years. He joined the Tunnellers during the late war and became a Captain in the Royal Engineers. He was connected with the Roads Department of the City Engineer of Johannesburg for the past ten years.

Mr. C. A. P. Gerntholtz, who died on the 27th November, 1933, in his thirtieth year was born in Pretoria, in 1904. He was educated at the German Primary School and later at the Oost Eind High School, where he matriculated in 1921. He entered the office of Mr. J. R. Burg in Pretoria and attended the classes held in the Pretoria Technical College and was registered as an Architect in 1926.

FINANCE.

Th Audited Accounts for the past year are submitted with this report.

Institute Account.

The General Revenue and Expenditure Account shows an increase in the amount of subscriptions paid by members of £120 19s. 6d., as compared with last year. Subscriptions outstanding at the end of 1933, however, amount to £782 6s. 3d., which is an increase of £167 18s. 0d. over the amount outstanding at the end of 1932. In view of the present great activity in the building trade all members should be benefiting by the additional work and it is hoped that a large amount of the arrears will be paid off during the current year.

Sales of contract agreements show an increase of £17 6s. 1d. as compared with 1932, but the amount received from the R.I.B.A. in respect of moieties is £72 16s. 0d. less as the 1932 payment was for the two years 1931/32. Total revenue was £869 15s. 0d. an increase of £65 9s. 7d. over the previous year.

Turning to the Expenditure side of the account it will be noted that the amount of levies payable to the Central Council amount to £342 19s. 7d., an increase of £98 9s. 8d. as compared with 1932, whilst general expenditure, including Secretarial fees amounted to £487 7s. 8d. a decrease of £5 12s. 6d. Total expenditure amounted to £830 7s. 3d., showing a surplus of Revenue over Expenditure for the year of £39 7s. 9d.

It will be noted from the Balance Sheet that the amount shown as due to the Central Council at the end of 1933 is £277 13s. 3d. This includes the amount of £95 6s. 9d. being levies on unpaid subscriptions at 31st December, 1931, referred to in last year's report which reduces the amount due to £182 6s. 6d. which has since been paid.

Accumulated Funds which stood at £390 18s. 11d. at the end of 1932 have been increased by the surplus of £39 7s. 9d. from Revenue and Expenditure to £430 6s. 8d. and on the formal approval of the Central Council to the writing off of £95 6s. 9d. credited as levies on unpaid subscriptions to 31st December, 1931, the funds will be increased to £525 13s. 5d. Of these funds £400 is invested as Capital for the Journal at four per cent. interest per annum.

The Balance Sheet discloses a satisfactory financial position as cash and liquid assets exceed all liabilities by £75 8s. 5d. whilst dues by members amount to £782 6s. 3d.

There is still an amount of £192 8s. 9d. being balance of the amount provided for the Architects Act Fund which will be repaid by the Central Council as and when funds permit.

Journal Account.

The Revenue from the Journal, which accrues almost entirely from advertisements amounted to £1,317 17s. 9d., a decrease of £438 3s. 11d. as compared with 1932, due to a considerable reduction of advertisements during the first half of the year.

Expenditure amounted to £1,345 9s. 10d., a reduction of £387 8s. 6d. on the 1932 figures. Expenditure, which included a payment to the Honorary Assistant Editor of £52 10s. 0d., exceeded Revenue by £27 12s. 1d.

Advertisements for 1934 are expected to show a satisfactory increase over 1933 as a number of new contracts have been obtained already.

GOVERNMENT AND PROVINCIAL ARCHITECTURAL WORK.

As a result of representations from your Committee and from a Sub-Committee of the Central Council a large amount of Government and Provincial work is being given out to the profession.

A memorandum of evidence was drawn up by your Committee to be placed before the Provincial Finance Commission to show the advantages of public work being given out to practising Architects. This memorandum was submitted to the other Provincial Institutes and a joint deputation representing the four Provincial Institutes submitted evidence to the Commission on the 22nd October last.

The Government has already invited Architects to submit designs in competition for the new Government Offices and Magistrates' Courts at Pietermaritzburg and a competition will also be held for the new Magistrates' Courts in Johannesburg.

The Transvaal Provincial Administration is promoting a competition for the Provincial Home Rietfontein to take the place of the Rietfontein Chronic Sick Home.

It is expected that a large amount of the Union and Provincial Architectural work will now be given out to members of the Profession.

CONDITIONS OF BUILDING CONTRACT.

A revision of these conditions will come up for consideration in May or June this year and any members having suggestions or criticisms to make are requested to send these in to the Secretary.

UNPROFESSIONAL CONDUCT.

Enquiries were made into several cases of alleged unprofessional conduct, in each case the allegation being that work had been taken on by one member whilst the claim of another member for work previously done on the same job was unsatisfied. The attention of members is drawn to Regulation 89 (k) of the Act which should be carefully observed where a case of this description arises.

CONTRAVENTIONS OF THE ACT.

On evidence submitted by your Committee two prosecutions against unauthorised persons holding themselves out as Architects were instituted and in each case a conviction against the person accused was obtained.

COMPETITIONS.

The following competitions were promoted during the past year :—

Electricity House :—In this competition the Assessor has awarded the premium of £300 for the winning design to Mr. H. A. McQueen, of Capetown.

New Government Offices and Magistrates' Courts, Pietermaritzburg, Natal. Notices regarding this competition were issued in November last and designs must be completed by the 15th March, 1934.

"The Provincial Home," Rietfontein :—Invitations to Architects domiciled and registered in the Transvaal have been sent out this month and designs must be delivered to the Provincial Secretary, Offices of the Administrator, Pretoria, not later than noon on Thursday, May 31st, 1934.

R.I.B.A.

Mr. V. S. Rees Poole was elected a Fellow of the Royal Institute during the year. Mr. Max Goldstein an Associate and Mr. J. Peel Nelson a Licentiate Member.

Mr. Maurice E. Webb has continued to represent this Institute on the Allied Societies Conference and the thanks of the Institute are due to him for his services in this connection.

Your President, Mr. A. Stanley Furner, whilst in England early in 1933, visited the Royal Institute and at their invitation attended one or two of their functions.

Through the kind offices of the President-in-Chief, Mr. F. W. Masey, this Institute has received a valuable collection of publications of the Royal Institute of British Architects.

A list of these publications is appearing in the February issue of the "South African Architectural Record," and members may have access to them for reference at any time at the offices of the Transvaal Institute.

THE SOUTH AFRICAN ARCHITECTURAL RECORD.

The Journal continues successfully as a monthly publication and your Committee desires again to express its appreciation of the excellent work being done by the Honorary Editor and his Assistants.

Members are urged to supply matter for publication as it would be of great assistance to the Honorary Editor if more articles and illustrations for publication were received from members. This appeal is made especially to those members who receive the Journal in other provinces outside the Transvaal.

Your Committee expresses its appreciation of the support received from the various firms which advertise in the Journal and trusts that members are, in return, extending their support to these firms wherever possible.

SOUTH AFRICAN ACADEMY.

The Fourteenth Annual Exhibition was held in the Selborne Hall from the 24th April to 6th May, 1933.

About the same number of exhibits were received as in the 1932 exhibition but the opinion expressed generally was that the standard of work exhibited was not as high as in some previous years.

As private exhibitions and public auctions appear to effect more sales for artist's works than are effected at the Academy exhibitions, the works of a number of the better-known artists are not available for the Academy, and those that are shown after the best have been sent to auction sales do not reflect the highest standard of these Artist's work.

The Crafts Section was well supported and an excellent standard of work was submitted.

The attendance of the public at the exhibition was most disappointing though not surprising in view of the very depressed period in which it was held.

Your Committee again records its appreciation of the generous grant from the City Council of Johannesburg which permits the holding of this exhibition in the Selborne Hall. The thanks of the Committee are extended to the Academy Sub-Committee, the Jury of Admission, the Hanging Committee and all who assisted in the arrangement of the exhibition also to Messrs. D. F. Corlett and D. Aitchison for work and material generously supplied.

The Fifteenth Annual Exhibition is to be held in the Selborne Hall from the 9th to 21st April, 1934.

TOWN PLANNING.

The Town Planning Association (Transvaal), on the Council of which this Institute is represented by two members, continues its valuable work.

The Council's annual report and an account of the proceedings at the Annual Meeting appeared in the December issue of the Journal.

Members who are interested may become members of the Town Planning Association at a subscription of ten shillings and sixpence per annum.

BENEVOLENT FUND.

Contributions to this fund during the year amounted to £83 8s. 0d., and interest on Investments provided £33 10s. 4d. making the total receipts £116 18s. 4d.

Grants-in-aid amounted to £62 3s. 0d. leava surplus of £54 15s. 4d. to be added to accumulated funds.

Mr. Allen Wilson was appointed a Trustee of this Fund in place of the late Mr. Walter Reid.

GENERAL.

Other matters which received the attention of the Committee were :—Municipal By-Laws, Conditions of Competitions, P.C. Items in Bills of Quantities, Tendering without quantities over £1,500, Standardisation of Bricks, etc.

Record of Attendances at Provincial Committee Meetings :—

	Possible	Actual
A. S. Furner (President)	12	11
G. E. Gordon Leith (Vice-President)	17	13
V. S. Rees Poole (Vice-President)	15	8
C. C. Deuchar	13	3
S. C. Dowsett	16	11
J. Lockwood Hall	6	3
G. M. Harrison	4	4
R. Howden	17	13
W. G. McIntosh	17	10
G. Moerdijk	8	5
Harold Porter	5	0
G. E. Pearse	2	1
F. Williamson	14	11
Allen Wilson	17	15

By Order of the Committee,

A. S. PEARSE,

Secretary.

The Herbert Baker Scholarship

The Institute of South African Architects, trustees of the Herbert Baker Architectural Scholarship, announce that the scholarship award for 1933 has been given to Mr. Robert Alexander Bruce, of Johannesburg.

The scholarship is of the value of £400, and is open to British subjects not more than thirty-three years of age who have completed six years in the study or practice of architecture, four years of which must have been spent in South Africa.

As winner of the scholarship Mr. Bruce is required to spend not less than seven months at Rome as his principal headquarters, acting under the direction of the British School at Rome. A portion of the period may, with the approval of the governing bodies of the British School at Rome, be spent at Athens. During the remaining portion of the scholarship period Mr. Bruce will be required to exhibit the results of his studies in a manner to be prescribed by the president of the Royal Institute of British Architects. On his return Mr. Bruce will be required to hold a similar exhibition in South Africa.

The competition this year was an interesting one. The subject prescribed was the planning of a vice-regal palace for a small state in a tropical zone, at a cost not exceeding £150,000. The rules of the competition laid it down that in this mythical state building conditions were somewhat primitive. Adequate skilled native labour could be employed, however, and simple materials could be obtained locally.

The winner of the competition, which is held every few years, intends to proceed overseas as soon as possible. Mr. Bruce is a married man, and it is his intention to take his wife overseas with him.

The son of Mr. and Mrs. Charles Bruce, of Turffontein, Johannesburg, Mr. Bruce was educated at the Technical High School. He afterwards went to the Rand University, where he obtained the diploma in architecture, and for some years now he has been associated with the well-known firm of Mr. Gordon Leith.

About four years ago Mr. Bruce went on holiday overseas and put in a considerable time in private architectural study. This overseas experience, in his opinion, very greatly contributed to his success in the Herbert Baker Scholarship competition. When he was in London in the course of his last visit, he worked for Sir Herbert Baker, the donor of the scholarship, for four months, and naturally, his first move on reaching London will be to call upon the distinguished architect.

Second place in the competition was obtained by Mr. E. Gordon Tucker, of Johannesburg, who, in addition to gaining second place was awarded honourable mention by the trustees.

The competition is open to South Africa and the Rhodesias, so that Mr. Bruce has earned for Johannesburg an honour which is coveted by student architects from Capetown to Abercorn. **The "Star."**

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British Standards Institution

TERMS AND DEFINITIONS APPLICABLE TO SOFTWOODS.

The Transvaal Provincial Committee has received a copy of the draft British Standard Specification :—"List of Terms and Definitions Applicable to Softwoods," on which comments are invited. Members may see this specification at the offices of the Transvaal Institute.

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Town Planning Association (Transvaal)

At the monthly meeting of the Council, held on the 6th February, Mr. E. H. Waugh was elected President, and Mr. J. Wertheim Vice-President for the ensuing year.

R.I.B.A. Special Final Examination.

NOTICE OF DISCONTINUANCE.

Notice is hereby given that the Special Examination for Associateship, R.I.B.A. (open to candidates over the age of thirty), will be discontinued in South Africa as and from the November 1934 examination.

Candidates wishing to enter for the November 1934 Examination should communicate with the Registrar of the Institute of South African Architects, P.O. Box 7322, Johannesburg.

This notice is published with the authority of the Standing Committee on Education and Examinations of the Institute of South African Architects, and with the approval of the Board of Architectural Education of the R.I.B.A.

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The trustees of the Herbert Baker Architectural Scholarship recently announced the result of the 1933 Competition, as follows :

1st : R. A. Bruce (Johannesburg).
2nd : E. Gordon Tucker (Johannesburg).
3rd : E. Douglas Andrews (Cape Town).

The Scholarship (the value of which has been increased to £400) has been awarded to Mr. Bruce. Mr. Tucker, author of the design placed second, received "honourable mention."

Of the fifteen candidates, from all parts of South Africa, who entered for the preliminary Competition, four were admitted to the Final. One of the finalists (who is in practice) did not, because of pressure of work, finish his drawings.

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Architectural Competition, Electricity House

The Assessor has awarded the premium of £300 to design No. 24, submitted by Mr. H. A. McQueen, Dominion House, Longmarket Street, Capetown.

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Mr. W. Percik, A.R.I.B.A., has commenced practice at Warwick House, 28, Joubert Street, Johannesburg.

Mr. E. Gordon Tucker, B.Arch., has been registered as a member of the Transvaal Provincial Institute and has commenced practice at 101, Stanley House, Johannesburg.

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Mr. T. Newhall Duncan, A.R.I.B.A., c/o Messrs. Kallenbach, Kennedy & Furner, has been registered as a member of the Transvaal Provincial Institute.

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Mr. James Corrigall, c/o Messrs. Moffat & Harvey, has been registered as a member of the Transvaal Provincial Institute.

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"Eighteenth Century Architecture in South Africa"

The review of the above book, which appeared in our January issue, was contributed by Mr. Norman Eaton, A.R.I.B.A., of Pretoria.

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R.I.B.A. Publications.

The following is a list of publications which have been received from the Royal Institute of British Architects through the kind offices of the President-in-Chief, Mr. Fredk. W. Masey.

Members desiring to refer to any of these works may do so at the offices of the Transvaal Provincial Institute, Johannesburg.

Composition and Strength of Mortars.	
Conservation of Ancient Buildings.	
Cottage Designs.	
Dilapidations.	
Intermediate Examination questions, June	1931.
Intermediate Examination questions, November	1931.
Intermediate Examination questions, June	1932.
Intermediate Examination questions, November	1932.
Intermediate Examination questions, May	1933.
Final Examination questions, July	1932.
Final Examination questions, December ..	1932.
Final Examination questions, July	1933.
Special Examination questions, December ..	1928.
Special Examination questions, July	1930.
Special Examination questions, December ..	1930.
Special Examination questions, July	1931.
Special Examination questions, December ..	1931

Special Examination questions, July .. .. 1932.
Special Examination questions, December .. 1932.
Special Examination questions, July .. .. 1933.
History of the Society of Architects.
Library Catalogue and Supplement.
Loan Library Catalogue.
Membership of the R.I.B.A.
Commercial Paints.
Forms "A."
Forms "B."
Forms "C."
Forms "D."
Forms "E."
Observations on "Vitruvii."
Orientation of Buildings
Prizes and Studentships pamphlet.
Proceedings of the First International Congress on Architectural Education.
Professional Conduct and Practice.
Regulations for Architectural Competitions.
Brickwork Tests.
Plumbing Report.
Damp Houses Report.
Report on the Education of the Architect in U.S.A.
Lightning Research Report.
London Building Acts Report.
Smoke Abatement Report.
Scales of Charges for Local Authorities, etc.
Scales of Charges for Speculative Builders' Work, etc.
Scale of Professional Charges.
Science Buildings.
The Architect and His Work.
The Designers of our Buildings.
Town Planning Conference.
Vaults of the Middle Ages.
The Acoustics of the Auditorium.
Art Museums and Picture Galleries.
Asylums and Asylum Planning.
Bank of England: Architectural History of the
Beginnings of Gothic Architecture.
Blickling Hall.
Church Building: Modern.
Continuation School Buildings in Germany and Austria.
Cottage Hospitals.
Dutch Art in London.
Electrical Stations.
Fire Escapes in American Commercial Buildings.
Fire Prevention and Fire Resistance.
Fireproof Construction of Buildings in the United States.
Forum (Rome).
Foundations.
Good Scholarship in Architecture.
Holy Sepulchre, Jerusalem.
Hospital Construction: Modern German.
Hospital Planning Abroad: Recent Developments in
Hospital Planning: English.
Hospitals: Modern.
House and Garden: Unity of the
Industrial Purposes: Design and Construction of Buildings for
Inlay and Marquetry.
Ionic Capitals in the British Museum.
King's College Hospital.
Lead Architecture.
Lethaby: W. R.
The Library and Collections of the R.I.B.A.
The Royal Institute Library and some of its contents.
Library Buildings: Plannings of Recent, in the United States.
Marbles.
Metal Work.
Mosaic.
Museum Buildings: American.
Peruzzi: Baldassare.
Regional Planning.
Royal Victoria Hospital.
Sanatoria.
San Gallo the Younger.
Science Buildings.
Sculpture Galleries.
Selininte.
Steel Buildings Construction.
Stonehenge: Architectural Discoveries of
Stones: Building.
Theories: Classical and Romantic.
Town Planning Schemes.
Tradition in Architecture.
Vitruvius: How to use
Why is Architecture the Mistress Art.

Copies of the following only are available.

Plaster Work.
Sculpture and Sculptors Methods.
Town Development.

Competition for "The Provincial Home" Rietfontein.

The Administrator invites Architects domiciled and registered in the Province of the Transvaal to submit designs for the above. Designs must be delivered to the Provincial Secretary, Offices of the Administrator, Pretoria, Transvaal, not later than noon on Thursday, May 31st, 1934.

The Conditions of Competition, particulars of premiums, and the plan of site can be obtained from the Provincial Secretary during March, 1934, on payment of a deposit of one guinea, which will be refunded to Competitors after the award has been made public or on return of the documents to the Provincial Secretary within four weeks before the date for submitting designs.

The Conditions can be inspected free of charge at the office of the Administrator.